The Iron Age

A Review of the Hardware and Metal Trades.

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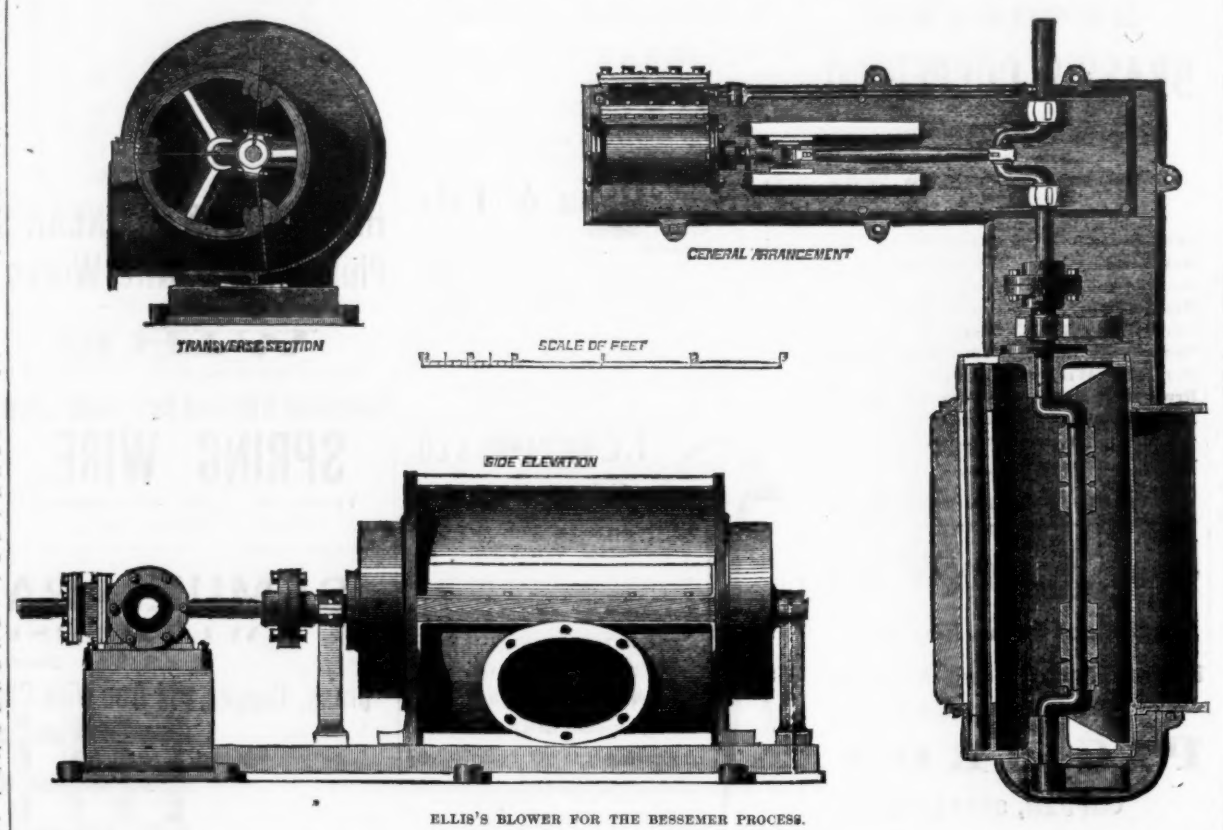
The Ellis Blower.

We present herewith illustrations of the Ellis Blower, an invention which is rapidly gaining favor with British engineers, and which has been employed at the Bessemer steel works of the Ordnance Company, Greenwich. The advantage claimed for it, and which are admitted by English engineering authorities, is that it consumes less power for the pressure than the fan. The engine has a 6½ in. cylinder 12 in. stroke, and supplies power enough to drive two No. 4 blowers, and the crank shaft is extended beyond the bearing to allow another blower to be put on if necessary. The diameter of the blower casing is 2 ft. 8 in., and the length inside 3 ft. 5 in. The diameter of the cylinder of the blower is 2 ft. outside, and it has two pulleys of the same diameter, one at each end. At 130 revolutions this machine supplies 2320 cubic feet of air per minute, or 139,200 ft. per hour, which is 50 per cent. in excess of the quantity theoretically necessary to convert 15 cwt. of coke into carbonic oxide. At the works of Messrs. Ellis, of Salford, is a blower of the same size not driven as in the illustration, but by a larger engine by a belt. The cylinder of this engine is 17 in. diameter and 36 in. stroke. It was carefully indicated with and without the blower. With the blower on, strokes per minute, 36; power indicated, 21·5 horse-power; with the blower off, strokes per minute, 36; power indicated, 18·4 horse-power. Therefore the power consumed in running the blower and bringing down the five tons of iron per hour 3·1 horse-power.



ELLIS'S BLOWER FOR THE BESSEMER PROCESS.

SAWS—ANCIENT AND MODERN.

The Saw in Classic Times—Ancient Materials and Methods of Construction—Saw Mills, &c.

The saw is not only one of the most useful, but one of the earliest, implements of which we have any account. Its invention dates back beyond historic times. In those most ancient records of the human race which are still preserved to us—the hieroglyphic inscriptions on the monuments of Egypt and Babylon—we find it represented. The ancient Greeks ascribed the invention to one of their own race, and inserted the inventor in their mythology as one of the greatest benefactors of the earliest ages. By some of them the invention was credited to Talus, and by others to Perdix, but the former was considered to have the best claim. Having, it is said, found one day the jawbone of a snake, he employed it in cutting through a small piece of wood, and was by this means induced to form a similar instrument of iron, to be used for a like purpose. It is sad to learn that he met the fate of so many other benefactors of our ungrateful race. He is said to have so roused the jealousy and ill-will of a conservative brother that the latter slew him, and when discovered in the act of heaping the earth on his dead body, remarked he was only burying a "serpent." It is evident from this myth that radical innovators on established usages were not duly appreciated by these old Greeks.

In a painting still preserved among the antiquities of Herculaneum, there is a representation of two genii engaged in sawing a piece of wood at the end of a bench, which consists of a long table resting upon two four-footed stools. The piece of wood to be sawn extends beyond the end of the bench, and is secured by cramps. One of the workmen is represented standing and the other sitting on the ground. The saw with which they work has a perfect resemblance to our frame saw. It consists of a square frame, having in the middle a blade, the teeth of which stand perpendicularly to the plane of the frame. The arms in which the blade is fastened have the same form as that which is given to them at present.

Although saws were invented and carried to a high degree of excellence at a very early period in the history of the Old World, they were entirely unknown in the New. When America was discovered by the Europeans, the instrument was entirely unknown to the aborigines. Indeed, in some parts of Northern Europe its introduction is comparatively recent. In Russia, until quite lately, the trunks of trees were split with wedges into as many and as thin pieces as possible, and if it was necessary to have them still thinner, they were hewn by some sharp instrument, on both sides, to the proper size. This simple but wasteful process was prevalent there till the time of Peter the Great, who endeavored to put a stop to it by prohibiting the transportation of hewn logs on the River Neva. There was something to be said in favor of the old method. Wood splitters perform their work more expeditiously than sawyers, and split timber is much stronger than that which has been sawn, for the fissure follows the grain of the wood and leaves it whole, whereas the saw follows the line chalked out for it, divides the fibers, and by this means lessens its cohesion and strength. Split timber, indeed, turns out often crooked and warped, but for many purposes to which it is applied this is not prejudicial.

The saws used by the ancient Egyptians were most probably made of copper, hardened by an admixture of tin, or by some other method now unknown, but at the present day they are almost all manufactured of steel. The modern artificers in Greece and other Eastern countries still adhere to the same method of cutting with the saw which prevailed among the ancients. In this country it is usual to make the saw cut by being thrust forward, and in consequence the teeth are generally made to look from the handle, but the Greek workman of to-day makes the cut in pulling. There is something to be said for and against both methods. The cut in pushing enables us to apply greater muscular energy, and the entrance of the saw being toward the eye we can readily follow the line; but, on the other hand, any sudden jerk or unskillful handling of the tool is apt to bend or buckle it. The cut in pulling, again, tends to strengthen the saw, so that a very thin plate may be used, requiring less waste of material. It is peculiarly suitable for workmen who adopt a sitting posture, but the saw dust is heaped upon the line, and has often to be swept or blown away. The advantages of both methods are obtained by stretching the saw tightly on a frame—and even more than these advantages, because we can use saw webs much narrower than when the plate is to be held by one end.

In one particular the modern saw is decidedly superior to that used either by the ancients or their Eastern successors—that of setting. Setting a saw consists in slightly bending the teeth to the right hand and the left, to an extent which varies with the nature of the substance to be cut. The effect is to make the width of the cut greater than the thickness of the saw blade, which thus encounters little or none of the resistance from binding which would result if both the blade and the cut or kerf were exactly of the same width. In the East, as among the ancients, this is effected by setting the teeth in groups of ten or a dozen each, first to the one side and then to the other. Obviously the correct method is the one now universally adopted among us—that of bending the teeth to the right and left alternately. This insures more evenness in the cut, and requires less exertion of force. Correct setting is a very important element in securing the efficient working of the saw, and great care is bestowed in its manufacture to obtain perfect regularity in this respect. The object is to have as little set as possible, so as to prevent waste of material. Soft and fibrous woods require more than hard. Friction is reduced sometimes by bending the halves of the log asunder, and in other cases by the use of soap, tallow or oil to lubricate the sides of the saw; it may be also avoided to some extent by making the plate thin toward the back. In the compass saw, a very small implement, used to cut a round or any other curved kerf, the teeth are not usually set, hence the edge is made broad and the back thin, that it may have a compass to turn in.

The most beneficial and ingenious improvement connected with this instrument was the invention of the saw mill. There is no account in any of the Greek or Roman writers of a mill for sawing wood, although there are some references to machines for cutting stone, and as the writers of modern times speak of saw mills as something new and uncommon, it would seem that the oldest construction of them has been lost, or that some important improvement has made them virtually new. Saw mills driven by water are said to have been erected in Germany as early as the fourth century, but our information concerning them is of the most fragmentary character. It is not until we come to the fifteenth century that we have any well authenticated account of their existence. About that time they began to be erected in considerable numbers throughout Northern and Western Europe. When Madeira was discovered by the Portuguese in 1420, the first settlers sent out there erected saw mills by order of the Infant Henry, for the purpose of preparing for shipment to Portugal the timber with which that island abounded. The city of Breslau had a saw mill in 1427, and the magistrates of Erfurt caused one to be erected in 1490.

In Norway the first saw mill was erected in the year 1530, and this mode of manufacturing timber was called the new art. In the adjoining kingdom of Sweden it was not till more than a century later that saw mills were introduced—the first was built in 1653. At Saardam was erected in 1596 one driven by water—the first in Holland. In all these places they seem to have been accepted quietly, to have provoked no opposition on the part of any portion of the community; the "new art" was adopted peaceably and permitted to work out its beneficent revolution undisturbed. At all events, if any discontent was manifested, it has remained unrecorded.

In England it was very decidedly otherwise. There saw mills met the same fate as printing in Turkey, the ribbon loom in the States of the Church, and the crane in Strasburg. In 1663 an enterprising Dutchman erected one near London, but the sawyers of that neighborhood objected to it so strenuously and effectively, urged their arguments against its continued existence with such force, that the Dutchman abandoned both the contest and the mill to their conservative requirements. They made a radical use of their victory by razing the mill to the ground and burning the machinery to ashes. In this same century the English Parliament enacted a law prohibiting the use of saw machines. Evidently the phrase, "as independent as a top sawyer," was invented in those days. In the year 1700 another effort was made by a Mr. Houghton, who, in laying before the nation the advantages of such a mill, expressed his apprehension "that it might excite the rage of the populace." It did. The populace tore his mill to pieces. In 1767, more than a century after the attempt of the Dutchman, whose name, by the bye, seems to have gone the way of his mill, another effort was made at a place called Limehouse to introduce sawing by machinery. The mob put their veto on that also; but the government had by this time taken a new departure—they made good the damage done to the works, and another mill was erected. After this the mob seems to have acquiesced in the inevitable. Some years previous to this a saw mill, driven by wind, had been erected in Leith, Scotland, which thus seems to have been the first that was fairly established in Great Britain.

The honor of being the first to apply steam as a motive power for driving saw mills is generally accorded to General Beatham, an English inventor, and in a patent taken out by him in 1793, a machine of this class is specified for operating on wood previous to its conversion into scantling.

Saw mills were introduced at an early period by the settlers on the American continent, and they have kept pace with, or rather in advance of, its progressive growth and development. To the hardy pioneer who pushes his resolute way into our vast Western forests, to hew out a home for himself, the saw mill is a faithful ally and helpful friend. It has not only rendered incalculable direct service in preparing lumber for the market, but its indirect assistance in helping to open up the wilderness for human habitation is immeasurable. It is not to be wondered at, therefore, that the manufacture of saws, and the construction of improved methods of applying motive power to increase their efficiency, should have engaged the attention of the best engineering talent in the country, and grown to be one of our most important industries. To trace the growth and development of the saw trade in the United States would be to attempt a history commensurate with the progress of American industry.

Of the later improvements in the manufacture of American saws it is unnecessary here to give any detailed account, especially as they have been frequently commented on in our columns. They embrace improved methods of tempering and hammering the steel, for securing accuracy in thickness, and evenness of temper; new and better modes of cutting and setting the teeth, and important improvements in the shape of the teeth, both of circular and straight saws. To these may be added recent inventions in saw mill machinery, whereby increased accuracy, speed and adaptability to more various kinds of work are attained. Take it altogether, the present condition of saw and saw machinery manufactures in the United States is a fair subject for national congratulation. At the present time American saws are unsurpassed in the markets of the world, whether they be regarded in respect to excellence of material and workmanship, or suitableness for accomplishing the work they are intended to perform; and a glance at the reports of the Patent Office, or a visit to any of our industrial exhibitions, will soon convince us that the spirit of improvement is still at work, still striving after some unattained degree of superiority over present achievements, and will rest at nothing short of perfection in material, form and adaptability.

The Lehigh Valley Railroad Extension.

A correspondent of the *Tribune*, writing from Bethlehem, Pa., says:

On the railroad in progress of construction from the present terminus of the Lehigh Valley Railroad, on the east bank of the Delaware River, opposite Easton, at the mouth of the Lehigh River, to Perth Amboy on Raritan Bay, the lower bay of New York city, there is an embankment one hundred and fifteen feet high across the Musconetcong "River," and a tunnel 5290 feet long—a fraction over a mile—through the mountain and water-shed which divides the waters of the Raritan and Delaware Rivers. The work on the Easton and Amboy Railroad, so called, though it is being built by the Lehigh Valley Railroad Co., and will of course be consolidated with that company on the completion of what is known here as Judge Packer's line to tidewater, is exceedingly heavy and costly from the Delaware to the Summit. The length of the Easton and Amboy Railroad is 60 miles. And when it is considered that hitherto the Lehigh Valley Railroad has had no terminus of its own on tidewater, but has been compelled to rely on facilities supplied in the vicinage of New York by the New Jersey Central and the Morris and Essex Railroad Companies, both of which companies are identified with lines of railroad into the Pennsylvania anthracite region, independent of the Lehigh Valley Railroad, in fact rivals to it, it will be perceived that the undertaking in hand will absorb not a few millions of dollars.

A railroad to Perth Amboy, however, will only give outlet to the coal traffic of the Lehigh Valley Railroad Company, which company necessarily will require a terminus at Jersey City for passenger and miscellaneous freight traffic. This latter consideration imparts importance to the West Line Railroad, which will intersect the Easton and Amboy Railroad east of Milford, and terminate on the Hudson River, on land of the Morris Canal Company, the Lehigh Valley Railroad Company being lessees of the Morris Canal, under perpetual lease.

The Lehigh Valley Railroad Company own and operate under lease, jointly, 240 miles of railroad in Pennsylvania. Its elongation toward New-York comprises more than 100 miles of new road. Beside, it has interests in Western New-York, Buffalo being one of its coal ports, and will be constrained to have under its sole jurisdiction a railroad to Philadelphia, since the Reading Railroad Company is now constructing a strategic line via Perkiomen to the elbow of the Lehigh at Allentown. A coal carrier cannot command a position in the general seaboard market unless it can fix rates from the mines through to tide-water.

The Delaware, Lackawanna and Western Railroad Company operate under ownership and lease a trunk line from Hoboken to Scranton, whence its roads fork one line southwestward down the Susquehanna to Northumberland, the other line northward to Oswego on Lake Ontario. The Central Railroad Company of New-Jersey operate under ownership and lease a trunk line from Jersey City to Wilkesbarre on the Susquehanna, with auxiliaries to the Schuylkill at Tamaqua and to the Lackawanna at Scranton. The Philadelphia and Reading Railroad Company operate under ownership and lease a road from Philadelphia to Williamsport on the West Susquehanna, with auxiliaries west to the Susquehanna at divers points, and east to the Lehigh via Reading, with a new line in progress to the Lehigh via the Perkiomen.

Like the other great anthracite carriers named, the Lehigh Valley Railroad Co. must have its own outlet to tide-water and its own communication with places of large consumption and active traffic. For about ten years from date of its first opening in 1856 the Lehigh Valley Railroad had its termini at Easton and Mauch Chunk, and its length was 46 miles. Subsequently other roads were consolidated with it, and tributary roads were acquired by lease, so that now, as already stated, its programme in operation comprises 249 miles of road, or more than five times the mileage operated for the first ten years of its existence. This percentage of increased mileage, though, is not so great as some of the other coal carrying corporations. The Philadelphia and Reading Railroad Co. for a long time operated ninety-eight miles of road, whereas it now operates 1385 miles of road, or more than fourteen times its original length.

With the merges of the Easton and Amboy Railroad and the North Pennsylvania Railroad, the Lehigh Valley Railroad Company will own a coal trunk line to New York waters, and a road for coal and miscellanies to Philadelphia. Then, from the largest two cities of the country, both on tide-water, the Lehigh Valley Railroad Company will operate roads into all three of the anthracite coal regions, and to Western New-York, and will have allies to Lake Ontario and Erie.

Projected Cable between England and Long Island.—It is now announced that the formation of a new system or combination of telegraph companies is about to be consummated. The project has been in contemplation for some time, but has been hastened, it is said, in consequence of the acquisition of the Western Union Telegraph Company by the Vanderbilt party. A company has been formed in England, with a capital of £2,000,000, for the purpose of laying a cable between the United States and England, the terminus on this side to be at some point on Long Island. The directory includes prominent English and American capitalists. A large portion of the cable is said to be already constructed, and all the contracts, if not already signed, soon will be. When laid, the cable will be connected with the wires of the Automatic Telegraph Company, which are now in operation. These wires will be extended along the line of the Erie, Baltimore and Ohio, and Pennsylvania Railroads. Indeed, it is understood that J. Edgar Thomson, president of the Pennsylvania Railroad, has already given orders to extend the automatic wires. The object of the railroad co-operation in the enterprise is understood to be a desire to thwart any espionage of rival railroad enterprises over the particular messages relating to their business.

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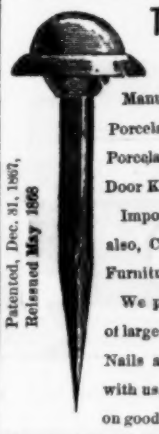

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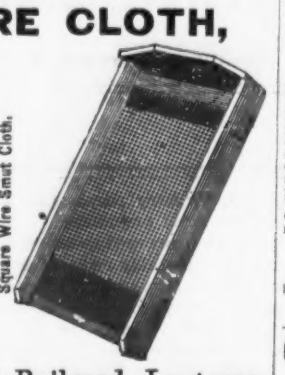

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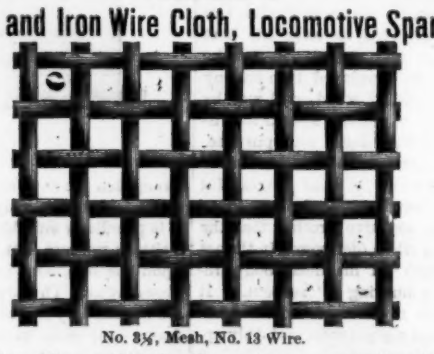

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10	3.47	40	11	3.20	38	12	2.80	35	14	2.43	33	16	2.00	30	18	1.39	30
11	2.75	32	12	2.45	31	13	2.15	30	15	1.97	30	17	1.47	25	19	1.08	25
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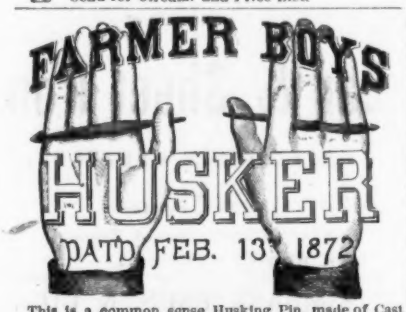

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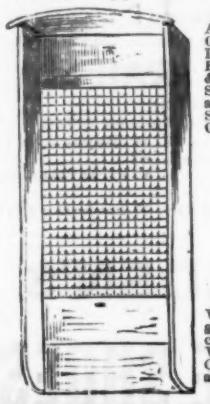

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Test of a Stationary Engine.

A few preliminary remarks on the test described in the accompanying report may not be out of place. A pair of high pressure engines—diameter of cylinders, 20 inches; length of stroke, 4 feet—were fitted with a patent condenser, under the guarantee that several tons of coal would be saved per week, it being understood that all leaks of joints, valves, pistons, &c., were to be repaired by the proprietor. An inspection of the coal account, after the condenser was attached, showed that the consumption of coal was increased, and the engineer insisted that there were no leaks, and that the whole fault was with the condenser. The condenser in question has already obtained considerable reputation, and is in use in various parts of the country, giving good satisfaction. It was necessary, however, to bring facts to bear in a case like this, and to show the existence of leaks beyond controversy. In this regard, the report will speak for itself, the test having determined an enormous drain of steam, palpable to the senses, and capable of being measured and weighed. It scarcely ever happens that users of steam-power are not amply repaid for the cost of careful investigations, and this report is published in the hope of calling attention to the importance of such tests. There is a tendency among persons who are proud to call themselves "practical" to decry all theory, but we think the reader will find the accompanying remarks quite practical enough, since they contain suggestions readily appreciated by the most practical man, in reference to the folly of generating steam by the consumption of fuel merely to blow it away without using it. If a man were to get up a high pressure of steam in a boiler for the pleasure of seeing it escape through the safety valve, his acquaintances would have their opinion of his sagacity. How many to-day are doing essentially the same thing, unwittingly:

80 BROADWAY, N. Y.

Henry L. Brevoort, Esq., New York: SIR.—As requested by you, I visited the works of the Peters Manufacturing Company, at Newark, N. J., on the 18th and 19th instants, and made careful tests of the engines, to discover if there were any leaks or other derangements. On the 18th instant the condenser was used, and on the 19th it was detached, the steam from the engine being allowed to exhaust into the atmosphere. In making these tests I took 12 indicator diagrams each day (3 from each end of each cylinder), at suitable intervals, so as to obtain average conditions. I also noted down various other data as will appear in the course of my report. According to memoranda furnished to me, the consumption of coal for three days, when the condenser was in use, was at the rate of 14,667 pounds per day—and for three days when the condenser was detached, at the rate of 12,667 pounds per day—showing a gain in fuel by taking off the condenser of 15·79 per cent.

During the two days I was at the works, the conditions, in regard to the power developed by the engines, were nearly identical, an average of all the cards taken on the 18th instant, when the condenser was attached, giving a mean pressure on the piston of 30·9 pounds per square inch, and 199·6 indicated horse-power, while on the 19th instant, when the condenser was taken off, the average mean pressure was 29·9 pounds per square inch, and the indicated horse-power 198·44.

I have taken from the cards the amount of steam used per indicated horse-power per hour, adding to those taken on the 18th instant the amount of steam used by the air pump. In making this calculation I have used the pressure of the steam in the cylinder, as shown by the cards, at the time the exhaust valves opened, and have multiplied the number of strokes made by the pistons per hour by the volume of that portion of the cylinders swept through by the pistons, from commencement of stroke to point of exhaust (in cubic feet with clearance added), and by the weight of a cubic foot of steam at the given pressure, thus obtaining the number of pounds of water, in the form of steam, used by the engines per hour. The cards, of course, do not show all the steam used in the cylinders, as they do not give the amount of water in the steam, the amount of radiation and condensation, and the amount of steam that leaks past the valves when the cylinder is opened to the exhaust. But under the present circumstances they give good comparative results.

As shown by these calculations, the amount of water per indicated horse-power per hour (adding that required to work the air pump), on the 18th inst., was 23·18 pounds. On the 19th inst., the amount of water required per indicated horse-power per hour, was 26·98 pounds.

According to this, it appears that the engines, when exhausting into the air, required an evaporation of 16·39 per cent. more water to enable them to do the same work as when using the condenser, and did this with 15·79 per cent. less coal.

A conclusion so anomalous could only be reached by ignoring the question of leaks around the engines, unless the loss was caused by some defect in the condenser.

There are only two ways in which the use of the condenser could occasion a waste of fuel: 1st. By creating additional back pressure, instead of lessening it. 2d. By using more power to work the air pump than would compensate for the vacuum produced. I will examine both of these points.

From the indicator cards taken, the mean pressure per square inch, due to a vacuum when the condenser was in operation, was ascertained to be 5·14 pounds, and the mean back pressure per square inch 2·29 pounds, so that the condenser, instead of increasing the back pressure, reduced it to the extent of 7·43 pounds per square inch, or at the rate of 24·44 per cent. of the total mean pressure on the pistons.

In regard to the second point, the average speed of the air pump was 136 strokes per minute, and calculating from its piston displacement, the most water it could have delivered in that time was 6181·5 pounds. This water had to be lifted a distance of 14 feet, so that the work required from the pump, at its maximum, would be about 2·63 useful horse-power. As will appear further on, very much less than the maximum quantity of water was actually delivered by the pump.

When the engines were running without the condenser, the steam was exhausted through three feed water heaters, thereby increasing the amount of back pressure. Credit should be given for the increased heat of the feed water, since, when the condenser was in use, the exhaust steam only passed through one heater, and the feed water did not have so high a temperature. Means of a number of observations of the temperature of the feed, gave the following results:

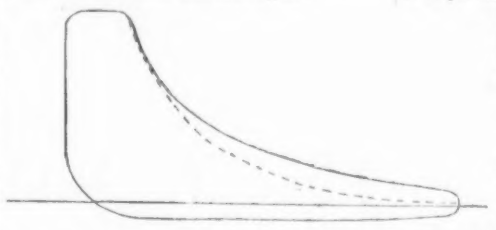
June 18	141.°5
June 19	169.°4
Difference	27.°9

The amount of gain from the increased heat of feed water is readily calculated. The mean pressure of the steam per gauge, on the 19th instant, was 80·6 pounds per square inch. Steam of this pressure has a total heat of 1209.°3. Hence, with the feed water at 141.°5, a pound of water must have 1067·8 units of heat imparted to it by the fuel to be converted into steam, and when the feed water is at 169.°4 it will require 1039.°9 units of heat. The per cent. of gain by the increased heat of the feed water will be

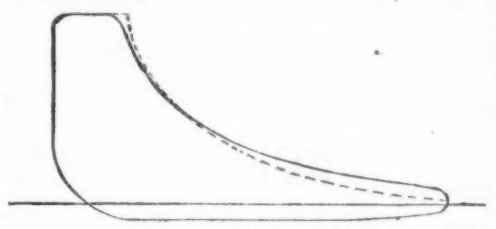
$$\frac{(1067{\cdot}8-1039{\cdot}9)\times 100}{1067{\cdot}8}=2{\cdot}67$$

The gain by the use of this arrangement of heating feed water is somewhat questionable. The back pressure produced by exhausting through the heaters, is 2·29 pounds per square inch, or 9·7 per cent. of the total mean pressure on the pistons, and produces a saving of 2·67 per cent. In other words, nearly 10 pounds of coal are burned in order to save 3.

It will be advisable, then, to return to the engines, and endeavor to discover leaks of steam. It must be evident that if valves and pistons are tight there can be no steam admitted to the cylinder after the steam valve has closed, nor can any be lost from it until the exhaust valve is opened, and under ordinary circumstances the indicator will show if these conditions obtain in actual practice. I give a tracing of an indicator diagram, taken on the 18th inst., and have added a dotted line, showing approximately the form of expansion curve if valves and pistons had been tight.*



The marked difference between this curve and the one actually produced is still more noticeable in most of the other diagrams, showing conclusively the existence of an excessive leak either in steam valve or in joints of steam chest. Below will be found a tracing of the same diagram, with a dotted line, showing the form of expansion curve, with valves, &c., in good condition, the mean pressure on the piston being



the same in the actual and theoretical diagrams. Mere inspection of this card will show that the same amount of work will be done with far less steam, if the card is taken as marked by the dotted line, and a calculation gives 18·37 per cent. less steam to do the same work, if the engines performed as indicated by the dotted line.

But this waste of steam is small in comparison with that lost when the engine is exhausting. If there is a leak of valves or steam chest while the cylinder is taking steam, this becomes far worse when the pressure is diminished by the exhaust. A good idea of the state of things existing in these engines can be obtained by imagining a steam pipe to be tapped into the cylinders for the purpose of admitting steam continually, during both the periods of admission and exhaust in the cylinders.

The steam valves of these engines close quickly, and it is easy to calculate the difference in the amounts of steam in the cylinders at points of cut off and exhaust. The mean of all the diagrams shows a difference of 75·5 per cent., or, in other words, that while the pistons are moving from point of cut off to point of exhaust, 75·5 per cent. as much steam leaks in as was previously admitted. Of course when the exhaust valve is opened, a still greater leak takes place under the diminished pressure. Fortunately I was able to determine the amount of this leak (which the indicator does not show) quite accurately.

On the 18th instant, while the engines were stopped, a simple test showed that the pistons were not tight, but the amount of leak from that cause is not to be compared with the one already pointed out. So large a leak can hardly be due to the improper fitting of the steam valves, and I am of the opinion that it will be found in some portions of the steam chests which have several internal joints.

I will now describe the method by which I ascertained the amount of leak that occurred during the exhaust. When the condenser was in operation the condensing water and the condensed steam were discharged by the air pump into a large tank. This water entered the condenser at a temperature of 71°, and was discharged at a temperature of 124.°5, having acquired 53.°5 from the condensed steam. I obtained the quantity of water discharged by the air pump per minute by observing the time required to fill a tub of known dimensions held under the discharge pipe. An average of seventeen careful experiments of this kind gave the time of filling the tub as 3·37 seconds, and in addition, some little water splashed over at each experiment, owing to the violence of the the discharge. I certainly err on the side of safety in assuming the time as 3½ seconds. The capacity of the tub was 4521·37 cubic inches, which would give a discharge per minute of 335·5 gallons, or 2792·19 pounds. Somewhat more water per minute was undoubtedly discharged, but in the absence of exact measuring apparatus, a perfectly safe estimate, assuredly within the limits, seems advisable. Good steam pumps will deliver from 90 to 95 per cent. of the quantities due to the displacement of pump pistons, and the quantity I have taken is only about 45 per cent. of the maximum.

The calculations of the amount of steam used, from measurements of the quantity and temperature of the discharge water, is one of the most elegant and accurate tests of the efficiency of an engine; and it is rarely that so good an opportunity for obtaining these data is secured without considerable preparation.

The amount of water delivered per minute, as before remarked, was 2792·19 pounds, and its temperature was raised 53.°5. The method of obtaining the amount of steam used by the engines per minute from these data is as follows:

Let X = pounds of steam used per minute.
Let W = pounds of condensing water.
Then from the observation,

$$W + X = 2792{\cdot}19.$$
$$W = 2792{\cdot}19 - X.$$

The steam at the point of exhaust had a mean pressure, as shown by the indicator diagrams, of 19·5 pounds per square inch, so that each pound of steam contained 1183·1 units of heat. When condensed the temperature of this steam was 124.°5, so that each pound had imparted 1183·1 − 124·5 = 1058·6 units of heat to the condensing water, and by this means had raised its temperature 53.°5.

From these considerations an equation can be formed, and the amount of steam used per minute determined.

X × 1058·6 = units of heat lost by the steam.
W or (2792·19 − X) × 53·5 = units of heat imparted to condensing water.
And as these must be equal
X × 1058·6 = (2792·19 − X) × 53·5.
Whence
X = 134·32.

This 134·32 is the number of pounds of steam used by the engines and air pump per minute, and we must next ascertain the amount of steam used by the air pump. The useful work of the air pump is the lifting of 2792·19 pounds of water 14 feet high per minute, which amounts to

$$\frac{2792{\cdot}19\times 14}{33{,}000}=1{\cdot}18 \text{ horse-power.}$$

Beside this useful work, the pump must overcome the friction of its moving parts, and the friction of the water in the passages. At a careful test of steam pumps at the fair of the American Institute in 1867, the Knowles pump gave an efficiency of 44·38 per cent., one pump of another make giving as low an efficiency as 18·33 per cent. I will assume this lowest efficiency for the present case. On this supposition, to produce 1·18 horse-power of useful work, the pump must have an indicated power of

$$\frac{1{\cdot}18\times 100}{18{\cdot}33}=6{\cdot}653$$

(It is proper to remark here that, according to the efficiency of this pump, as shown by experiments, the indicated horse-power would only need to be 2·66, and it will be evident that I have allowed an excessive margin of safety). The mean pressure of steam required to produce this horse-power at the speed at which the pump was working, is 15·12 pounds per square inch, and allowing a back pressure on the piston of 9 pounds per square inch, the pressure per gauge should be 24·12 pounds—say 25.

On this assumption the pump would require 6·49 pounds of steam per minute, which is an allowance of nearly a cubic foot of water per indicated horse-power per hour. The amount of steam used by the engines per minute will then be 134·32 − 6·49 = 127·83. According to the indicator diagrams, the amount of water used by the engines per indicated horse-power per hour was 21·23 pounds, and this calculation shows the amount actually used to be 38·43 pounds, giving a leak while the engines were exhausting of 81·02 per cent.

This is quite sufficient to account for the apparent paradox mentioned in the first part of this report, of the engines, when the condenser was detached, using more steam and burning less coal. I had no means of ascertaining the amount of steam that leaked during the exhaust, when the engines were disconnected from the condenser, but of course it would be less than when the condenser was in operation, since in the latter case the pressure of the exhaust was much diminished.

It is a matter of surprise that the condition of affairs was not discovered long ago by a simple inspection of the coal account. Here is a case in which, under the most moderate estimate, 50 per cent. of the effect of the fuel has been passing silently away, unseen and unsuspected, without doing any useful work. It is another illustration of the fact which is so frequently demonstrated, that users of steam power cannot employ too many checks to prevent and discover waste; and it is a strong tribute to the value of that useful instrument—too often despised by the so-called practical man—the steam engine indicator. I assume that the owner of these engines will seize the first opportunity to have this great leak stopped, and I am confident that when this is done, he will realize the full benefit claimed by you for the application of the condenser. I must add, before closing, that I have carefully examined the construction and operation of the condenser, in connection with my inspection and test of the engines, and it gives me pleasure to state that it seems to be well designed and constructed, and of ample proportions.

Respectfully, RICHARD H. BUEL.
June 24, 1873.

* As it is well known to engineers that, even if valves and piston are tight, the actual curve of expansion may be higher than the theoretical, owing to condensation and re-evaporation, or from the presence of a large quantity of water in the steam, I would not so confidently have attributed the difference in this case to leaks, unless subsequent tests (as shown in the report) had confirmed this view.

Mr. J. M. Goodwin, of Cleveland, Ohio, has lately patented certain improvements in bridge construction, which are described as follows in the specifications: "The object of my said invention is to relieve the principal girders, chords, side or middle trusses or beams of bridges, and girders, beams or trusses used in structures other than bridges, of the action and effect of loads moving along or over them, technically known as 'rolling loads;' and to cause the stress of any load passing along or over, or distributed unequally upon, any bridge or structure in which said invention or device is used, to act always in a direction nearly absolutely vertical, and practically vertical, upon one certain surface, and at the same time to cause the stress of such rolling loads to be brought upon such surface or surfaces by a gradual accumulation, the stress upon such surface or surfaces of the principal girder or girders, acting at all times in a direction practically vertical, as aforesaid, and with a force always in proportion to the distance from the ends of the bridge at which any load upon the supplementary girders aforesaid may be (the said load being in this connection considered as passing from end toward center, the force only, and not the character, of such stress being changed by the changing of the position of the load), thereby removing from the principal girder or girders those undulatory and otherwise disintegrating disturbances of fiber which are produced by the direct action of rolling loads; and also to cause the stress of any unequally distributed load to be transmitted to the principal girder or girders aforesaid, through the surface or surfaces, and in the direction, nearly and practically vertical, hereinbefore specified."

The Mobile and Ohio Company has laid in its yard, in Mobile, 100 yards of a light rail invented by Mr. H. G. Angle, of Chicago. The rail, which weighs 25½ pounds per yard, is rolled nearly in the form of a common angle-iron, and bolted on a stringer of wood, five by six inches, which is spiked down to the ties, from which the ordinary rails have been removed. Should it stand the severe test to which it is subjected in the yard, the company will lay it on all its branch lines. The cost is stated to be about 30 per cent. less than that of a 50 pound T rail.

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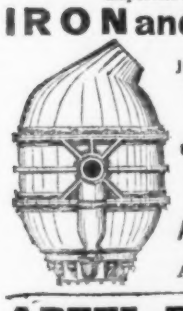
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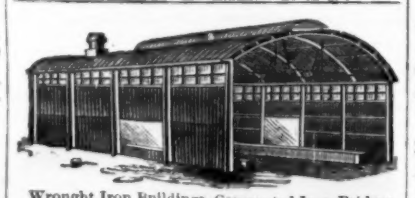
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SECOND FLOOR

New Patents.

We take from the records of the patent office at Washington the following specifications of certain patents lately issued, which will be found interesting:

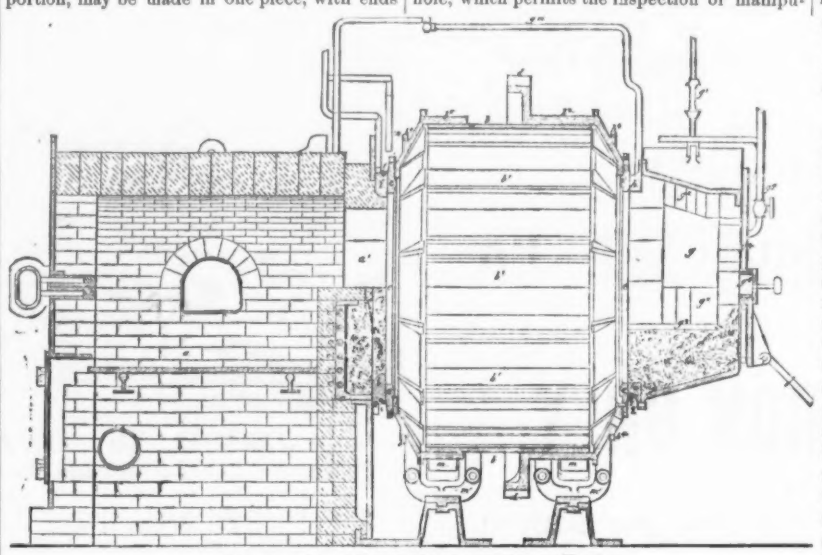
IMPROVEMENT IN ROTARY PUDDLING, MELTING AND HEATING FURNACES.

Specification forming part of Letters Patent No. 142,152, dated August 26, 1873, issued to Samuel Danks, of Cincinnati, Ohio:

This invention relates to improvements in the construction of the rotary puddling, melting and heating furnaces described in the specifications of former Letters Patent heretofore granted, and to apparatus employed in connection with the said furnaces.

Figure 1 is a longitudinal vertical section of improved puddling furnace. Fig. 2 is a quarter transverse vertical section. Fig. 3 is a section of the end of the revolving cylinder, showing modifications in its construction. Like letters indicate the same parts throughout the drawings.

a is the grate, or fire chamber, which communicates by the aperture, a^1, with the revolving cylinder, or chamber, *b*, which forms the puddling chamber, or refinery. At the lower side of the said aperture is the bridge, *c*, which is provided with pipes, *c'*, through which water or other cooling fluid is conducted. The said revolving cylinder may be formed of either wrought or cast iron, and its body, or circular portion, may be made in one piece, with ends



IMPROVED ROTARY PUDDLING FURNACE.—*Fig.* 1.

of either wrought or cast iron secured thereon; but the said cylinder should be formed of a number of staves, or plates, b^1, properly fitted together, as shown in the drawing, and riveted or bolted at the ends to rings, or hoops, b^2, b^3, of wrought or cast iron. These rings and the ends, b^4, may be cast in one piece, as shown in Fig. 1, or the ends, b^4, may be of wrought iron riveted on the same rings, as shown in Fig. 3. Upon or in one piece are cast with the said staves the hollow ribs, b^5, Fig. 3, which serve to hold the fettling, or lining. Inside each of these hollow ribs a bar, b^6, of wrought iron is placed, whose ends are dovetailed and secured by casting them in the stave. These wrought iron bars strengthen the staves, and retain them in place if they should be fractured. When the body of the cylinder is cast or formed in one piece, they are provided with longitudinal apertures or slots, in which I place the hollow ribs b^5, the same being secured in the said slots by bolts or rivets, or the said hollow ribs may be cast in the cylinder. A fixed casing is sometimes used surrounding the revolving cylinder, to form an air or water chamber for cooling the said cylinder. The ring or hoop b^2 has cast or fixed on it the toothed wheel *d*, whereby the cylinder is rotated. If the wheel is not cast upon the said ring, the latter is formed with a flange or collar, to which the wheel is attached by bolts or otherwise. The said wheel gears, with a pinion on a shaft which is driven by a steam engine or other motor. Both of these rings b^2 or hoops have an inclined flange to hold the cylinder ends b^4, which are made of wrought or cast iron, pressed or otherwise worked into the proper shape, and each end is preferably made of one plate or sheet of iron. These ends are somewhat of a dished form, as shown—that is to say, they

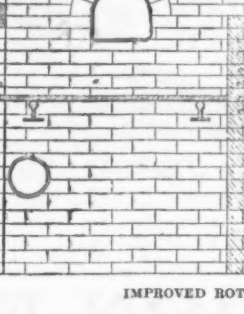


Fig. 2.

have an inclined or sloping portion—whereby they are secured to the flanges of the rings, and a flat portion square or perpendicular to the cylinder's axis, and to this flat portion are attached facing or abrasion rings *e*, made of either wrought or cast iron. To the inside of the end pieces, channel pieces *f*, of angle or other iron, are secured to hold the lining or fettling. The removable or shiftable piece *g* is suspended by rods g^1 to rollers on an overhead track, or is otherwise supported, in such a manner as to permit its adjustment to be conveniently effected. In combination with the abrasion rings *e* on the cylinder ends, fixed abrasion rings *h* and *i* are arranged on the shiftable or movable piece *g* and on the bridge *e*. The abrasion rings on the cylinder are fitted to turn freely against the faces of the said fixed rings, while forming with the same a tight joint, which prevents the escape of any molten metal from the furnace. The said abrasion rings, when worn, are readily removed and replaced by new rings. The fixed rings are provided with a pipe, 1, or other suitable channel, for water, steam, or other fluid, to keep the adjacent parts cool. The water pipe or channel 1 should be arranged to conduct the water down on both sides of the rings; and it is preferable to divide the latter, either at the top or bottom, or both, into two portions to prevent their fracture by unequal expansion. Perforated pipes or other similar contrivances are also arranged to throw jets of water upon the cylinder ends b^4 to keep them and their lining cool.

The upper part of the shiftable piece is lined internally with fire bricks g^2, as shown, but the lower portion of the said piece is exposed to the action of the molten metal, which sometimes flows into the same from the cylinder. It must, therefore, be lined or fettled with the compound described in the specification of patent of 1867; and the interior of the said shiftable or removable piece is provided with a shelf, g^3, on each side. These shelves carry the internal brick work g^2, and permit the lower part of the said piece to be suitably lined or fettled, and this lining to be readily repaired or renewed when required. The outer end of the piece *g* is provided with a chamber, g^4, for the passage of air, water, steam or other fluid to protect it from the heat. g^* is a stopper hole, which permits the inspection or manipulation of the metal in the furnace. The aforesaid movable or shiftable piece *g* is supported by props against the cylinder *b* and the stationary part of the flue in such a manner as to allow of its adjustment to compensate for the wear of the aforesaid abrasion rings or other parts, and the expansion and contraction of the cylinder, while it permits the ready removal

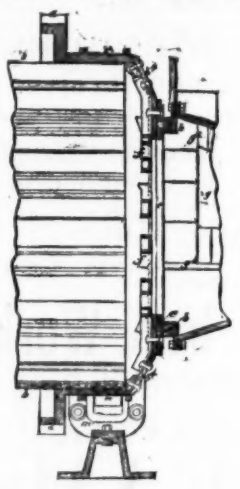


Fig. 3.

or adjustment of the said piece *g* to one side of the cylinder. These props are rods or bars of iron, or other suitable metal. At their upper end they rest against studs or projections on the said shiftable piece. At their lower ends they have jaws, which take hold of pins on the side of the ratchet wheels. The latter are supported in blocks, firmly bolted down upon the floor or foundation, and are provided with pawls which allow them to turn only in one direction. By turning the ratchet wheels the props are made to press forcibly against the shiftable piece *g*, which is thereby forced into close contact with the cylinder. It may be released therefrom, when required, by raising the pawls and turning back the ratchet wheels to allow the piece *g* to be moved away from the cylinder's mouth. Instead of ratchet wheels and pawls, eccentrics, screws, or other similar contrivances, for adjusting the props may be used. The said shiftable piece, as above stated, is suspended by chains or rods from a crane or over-head track, and is moved to or away from the cylinder and flue by a handle or winch, through the medium of a rack and pinion, or other suitable apparatus. The pipes, g^9, g^{10}, which conduct the water to and away from the shiftable piece, *g*, are jointed to allow them to follow the said piece in its adjustment. Flexible hose may be used to connect the pipes. The revolving cylinder, or chamber, is supported upon rollers, which are carried in blocks or brackets, *m*, secured to the foundation or floor. It is desirable to have a separate block, or bracket, for each roller, so that the rollers or blocks may be readily adjusted to compensate for wear, and the cylinder thus be conveniently maintained in its proper position.

The cylinder of each furnace should be driven by a separate double crank engine, to permit the speed to be conveniently varied, as required, and also to permit the motion of the said cylinder to be readily reversed. The employment of a separate engine permits the attainment of these objects much more advantageously than if a number of cylinders were connected to a single large engine, which would necessitate a complicated and costly arrangement of gearing.

Claim—1. The cylinder of a rotating puddling, heating or melting furnace, constructed of separate staves, *b*, with hollow ribs and wrought iron bars cast in the said ribs.

2. The end rings, b^2, for securing the said staves, constructed in one piece with the end plates, b^4, as shown in Fig. 1, or secured to the said end plates by bolts or rivets, as shown in Fig. 3.

3. The fixed rings, *e*, *h*, *i*, Fig. 1, in combination with the channel for keeping them constantly supplied with water or other cooling fluid.

4. The fire-brick, or its equivalent, and the lining or fettling compound, described herein, for protecting the interior of the shiftable piece, *g*, in combination with the shelves, g^3, in the interior of said shiftable piece.

5. The adjustable props or their equivalents constructed to be used in combination with the said shiftable piece.

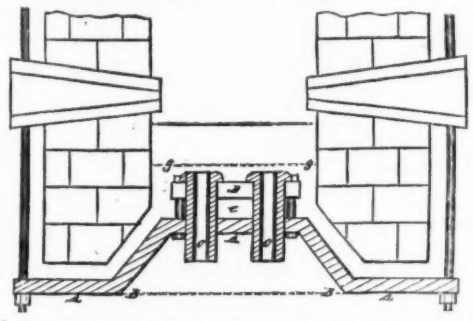
6. In combination with the rotating cylinder, *b*, the adjustable blocks, or brackets, *m'*, carrying the rollers, substantially as described, for the purpose specified.

IMPROVEMENT IN BLAST FURNACE BREAST PLATE.

Specification forming part of Letters Patent No. 141,043, dated July 22, 1873, issued to Robert A. Fisher, of San Francisco, Cal.

In some styles of blast furnaces the metallic spout through which the fluid slag and mat run from the furnace are attached to a metallic front technically called a "breast plate." The front or breast plate in common use is simply a plate of rolled or cast iron, a horizontal section of which is a straight line. The breast plate is held in position by bolts or side plates extending from the front to the back of the furnace. The slag and mat produced during the smelting process, near the small end of the tuyeres, flow from thence under the fire arch to the slag spouts. Unless maintained at a sufficiently high temperature the slag and mat in their passage to the slag spouts thicken, and sometimes chill or become solid. In order to keep the slag sufficiently hot to run easily it is necessary to maintain a heap of burning fuel within the walls of the furnace from the line of the fire arch *g g* to the breast plate B B. The amount of fuel required for this purpose in a large furnace is very great. Beside this disadvantage in the breast plate in common use there is also this disadvantage, that in the reduction of certain classes of ore the breast plate is rapidly corroded and eaten away if, by chance, it becomes exposed to the direct action of the slag and mat.

The improvements consist, first, in constructing the front or breast plate A of the furnace with an angular indentation, as shown in drawing, so as to carry that portion of the front in which the slag spouts C are secured almost up to the fire arch, thereby shortening the distance



IMPROVED BLAST FURNACE BREAST PLATE.

which the slag has to flow between the tuyere and slag spouts, and largely reducing the amount of fuel required to prevent the slag and mat from becoming chilled after passing under the fire arch.

To prevent the destruction of that portion of the breast plate on which the slag spouts are secured, there is attached, by rivets or otherwise, a shield or back, D, of wrought or cast iron, or its equivalent, inside of the usual front, and fill the space *e* intervening between the usual front and this shield with fire clay or other fire-resisting or refractory material, so that in case the shield or supplementary back piece D should become destroyed by corrosion a new one can be readily supplied in its place in a short time, and with very little trouble, as soon as the furnace is out of blast.

Claim.—1. The arrangement of the slag spouts in the front of the furnace, as described, so that they shall be heated from the fire-arch, preventing the slag from being chilled while passing out.

2. The shield or supplementary back D in combination with the front or breast plate of a smelting furnace.

Philadelphia Art Castings.

We take the following from the *Polytechnic Bulletin:*

In no better way can a calling be ennobled than by perfecting it, and of this we need no fuller illustration than that afforded by the Philadelphia Ornamental Iron Works, where, from the making of iron railings, the products of the works have been more and more improved, until the foundryman's art now embodies in iron and in bronze the grandest conceptions of the historical sculptor. Models from the studios of the most distinguished artists of America now come to Philadelphia to be cast. A few years ago they would have been sent, for that purpose, to Munich. This progress is chiefly due to Mr. Robert Wood, the intelligent and enterprising head of the firm, who, knowing the capabilities of his art, resolved to test them to the utmost.

His first popular success was the casting, in iron, of the colossal statue of Kentucky's great statesman, Henry Clay, originally designed, if we mistake not, for the capitol of that State, and cast in 1855. It has since been reproduced in iron for New Orleans, La., Pottsville, Penna., and Philadelphia.

Mr. Wood's first successful statuary casting in bronze, from an original design, was a bust of Col. Hawkins, in 1866.

This was followed by Ward's Commodore Perry, for Newport, Rhode Island; Thompson's General Sedgwick, for U. S. Military Academy, West Point; Brown's equestrian statue of General Winfield Scott, for Washington, D. C., and others.

On the molding and casting floor none but the most skillful workmen are employed. These, at the time of the visit, were molding a statue of General Israel Putnam. The model, which is of heroic size, is by J. Q. Ward, and is intended for Hartford, Conn.

For molding, not only is the trunk of the model separated from the head and members, but they, in turn, are divided into pieces of various sizes, larger where the surface is plain, and sometimes not over four inches square where the surface represents folds. The impression of each piece is carefully taken in sand; the piece is removed, the sand heated in a core oven and arranged with others in a flask, or casting box. The seams or open spaces are closed with sand, and ports are so made for the introduction of the metal that it will flow into the impressions from two or more directions. Sometimes, in molding the trunk, a portion of the back is first molded, then the baked core placed in and supported by projections in the usual way. In the upper half of the flask a portion of the front is now molded, and the two halves of the flask clamped securely together. The flasks are subsequently placed in the casting pit, in the molding floor, and slightly inclined to facilitate the flow of the alloy. Meanwhile the cannon which furnish the bronze are fused in a reverberatory furnace, metals added to improve the quality of the composition, which is removed in casting pots and poured into the flasks. After the castings have been taken from the sand, the nicest manipulation is necessary in so fitting them together as to conceal the joints when completing the statue.

The sand used is imported from France. It is of a light yellow color, and sometimes mixed with a dark brown American sand. Mr. White, of the visiting committee, thinks that he observed sand along the bluffs of the Mississppi, in Minnesota, not unlike the imported sand. He believes that it has not been used in foundries, and regards it as well worthy of a trial.

Mr. L. Thompson's model for a colossal bronze statue of General Winfield Scott, in which the hero is represented on foot, has been recently received at the works, and been partially unpacked. The statue will adorn the Soldier's Home, an asylum for invalid soldiers, Washington city.

In the fitting up and finishing rooms is a life size statue of General Philip Kearney, modeled by Mr. H. K. Brown, of Newburg, N. Y., and intended for the Capitol at Washington. It represents the General, standing.

Here, also, is the statue of Elias Howe, of the Sewing Machine, and the bas-reliefs for the pedestal. They are three in number. The first represents the inventor seated in his machine shop, contemplating a machine, which has a slight resemblance to a sewing machine.

The second shows a woman seated in a squalid chamber, her child at her feet, both apparently in wretched circumstances. The mother is trying to earn her daily pittance by her needle.

In the next scene, a total change has taken place. Seated in a neatly furnished room, a sewing machine by her side, and her child seated at her feet, sits the happy mother. The moral needs no interpreter.

What for this country is probably a new application of bronze, is seen here, viz.: a bronze tomb. It is to be erected at Albany, New York, to commemorate the late Erastus Corning, and was designed by Henry Dudley, of that place. The shape is that of a Greek cross, eight feet ten inches long, and four feet in hight. The design is chaste and beautiful.

Under the eaves of its roof-like top, a wreath of laurel leaves extends the entire distance round. The inscription upon it is as follows:

ERASTUS CORNING,
Dec. 14, 1794.
Entered into Rest
April 8, 1872.

At the head is the inscription:

"My hope is ever in Thee."

And at the foot is the arms of the Corning family, with the legend, *Nil sine numine.*

The Iron Works at Troy, N. Y.—With the exception of the Bessemer Steel Works, of Messrs. John A. Griswold & Co., there has been a general suspension of operations in the Troy Iron Works, and the firm named have made their continuance contingent upon the acceptance by the men of a reduction of 10 per cent. in wages below the usual winter scale. The Troy Car Company, which employs 500 men, will close very soon, and their workmen will be thrown out of employment. The company has now on hand $240,000 worth of cars which were ordered for the Canada Southern Railroad and a railroad in South America, but which the company has been ordered not to ship at present, as the railroad companies cannot pay for them. Troy also does quite an extensive business in the manufacture of stoves, though not so large as Albany. This industry still continues, with a partial reduction in the force employed. The prospect now is that 4000 or 5000 persons will be thrown out of employment in Troy the coming winter. The Corning Iron Works, which employ about 1500 men, will start work again if the employees accept an offer made by Mr. Corning of a reduction of 15 per cent. in their wages.

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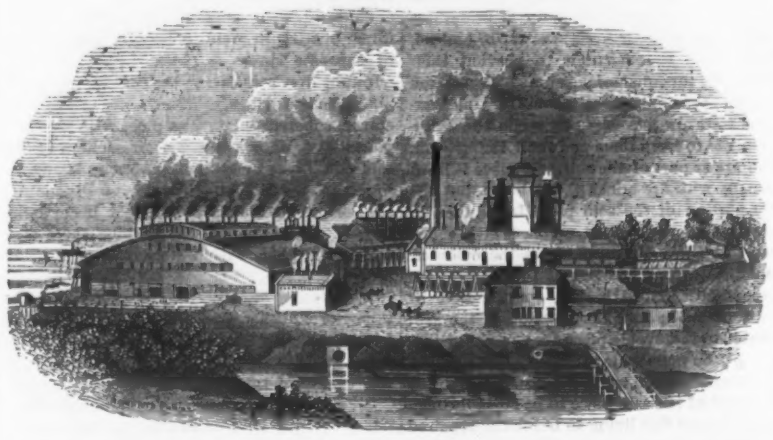

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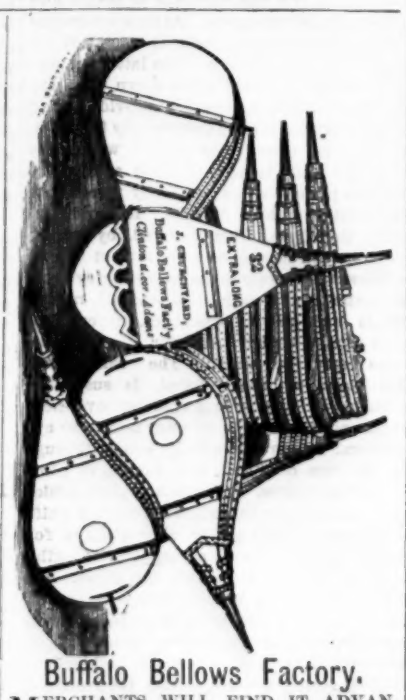

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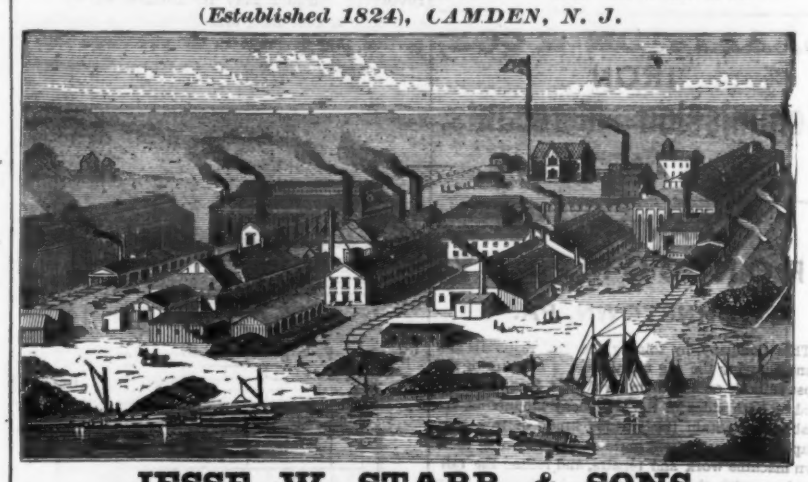

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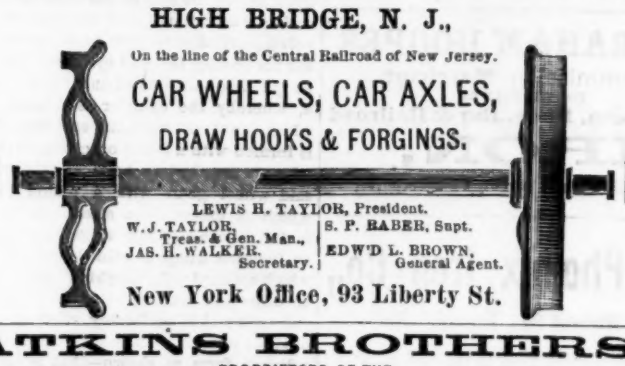

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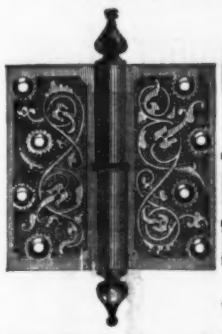

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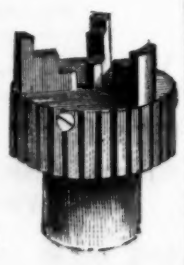

The Standard for Screw Threads.

Both the Master Mechanics' and the Car Builders' Associations have adopted what is known as the Franklin Institute standard, but which should be called the Sellers' system, as Mr. William Sellers was the author of it, and first proposed its use in a paper read before the Franklin Institute, April 21, 1864. A special committee was appointed at the same meeting to investigate the question of the proper system of screw threads, bolt heads and nuts. This committee reported on the 15th of December of the same year, and recommended substantially the same system proposed by Mr. Sellers, which report and recommendations were adopted by the Franklin Institute. Although both the associations first referred to have made this system the standard for railroad work, there is good reason for believing that many master mechanics and car builders do not understand clearly the nature of what we prefer to call the Seller's system of screw threads. Most of them seem to think that its peculiarity consists only in the number of threads to the inch. Now, obviously, a system which designated only the number of threads to the inch could hardly be called a system, as it would be possible to make threads of so many different forms that many bolts and nuts would not fit each other, or else fit so imperfectly as to have much less strength than they should have. In designing his system, Mr. Sellers, as might have been expected from a person with his mechanical skill and experience, has left nothing undetermined; and if screws are made as he has specified, there will be no difficulty in having bolts and nuts fit each other.

The object we have in view in writing about this subject again is to make as clear as we can the form and proportions of what has been made the standard system of threads for railroad works, so as to make it what it really should be, a "standard system," and not an approximation to it.

It is quite obvious that, if a workman were instructed to cut eight threads to the inch in a 1-inch bolt, by grinding the tool with which he cut the thread very "blunt," or with the sides at a very obtuse angle, the bolt would not fit a nut with very acute threads; or, if the thread of the bolt was acute, and that in the nut obtuse, they would fit imperfectly. The first thing, therefore, in a standard system is to fix upon the angle which the sides of the thread shall bear to each other. This in the Sellers' thread is 60°, as shown in the enlarged diagram, Fig. 1, below. In the Whitworth standard, which is almost universally used in England, and also to some extent in this country, the angle of the threads is 55°.

Now it is obvious that if a tool is ground with its sides at an angle of 60 degrees to each other, if the point is made sharp, after a very little use it will be worn more or less, so that the bottom of the thread will not be cut perfectly sharp, and therefore it will be difficult to make bolts and nuts with sharp threads fit each other accurately. It is also plain that the sharp edge of a thread gives very little strength to the screw, and yet diminishes that of the bolt very materially. It will also be impossible to measure the diameter of the screw at the bottom of the thread if it is made sharp, as its depth will vary as the point of the tool wears, and it is almost impossible to measure the diameter of such a screw accurately with ordinary callipers. It is also obvious that a sharp-edged thread in a bolt is very liable to be injured and bruised by coming in contact with other objects. To obviate these evils the Whitworth threads are made rounded at the top and bottom. "Its advantages"—quoting the language of Mr. Sellers in the paper referred to—"over the sharp thread are, increased strength to the screw from the absence of acute corners, and the greater security from accidental injury which the round top possesses. Its objectionable features are, first, that the angle of 55 degrees is a difficult one to verify; it is probable no gauges to this angle, made independently of each other and without special tools, would correspond with sufficient accuracy. Secondly, the curve at the top and bottom of the thread of the screw will not fit the corresponding curve in the nut, and the wearing surface in the thread will be thus reduced to the straight sides merely.

"It is not to be inferred from this that these curves cannot be made to fit, but only that the difficulties in producing contact are so much increased by the peculiar form that in practice it will not be accomplished. Thirdly, the increased cost and complication of cutting tools required to form this kind of a thread in a lathe, it being requisite that this tool shall have at least three cutting sides, in order to form the round top between two of them. The necessity of guarding the edge of the thread from accidental injury becomes more and more apparent as the size of the bolt is increased, and we have recognized this by finishing bolts with a small flat top upon the top of the thread. It being conceded that the flat, angular sides are necessary, we have only to choose between the rounded and flat top; and having examined the former, it only remains to notice whether the flat will be found free from the objections urged against the round. As the sides of the thread are the only parts requiring to be fitted, and as these are of the same shape as the sharp thread, the one will be as easily made as the other. The width of the flat top will be determined by the depth to which the thread is cut, so that the same tool can be used in both cases. The flat on the top of the thread being required to protect it from injury, it is evident that a similar shape at the bottom would give increased strength to the bolt, as well as improve its appearance. To give this form requires only that the point of the cutting tool shall be taken off, and then it is evident this thread can be cut in a lathe with the same tool and in the same manner as the sharp thread."

The rule given by Mr. Sellers for proportioning this thread is as follows: "Divide the pitch, or, what is the same thing, the side of the thread, into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread, then the flat top and bottom will equal one-eight of the pitch, the wearing surface will be three-quarters of the pitch, and the diameter of screw at bottom of the thread will be expressed by the formulæ:

$$\text{diameter} = \frac{1{\cdot}299}{\text{no. threads per inch.}}$$

In order to make the form and proportions of this standard thread as plain as possible, we have an enlarged diagram engraved, so as to represent the different parts clearly. x represents the pitch, d the diameter of the screw in inches, v the number of threads to the inch, n the diameter at bottom of thread, m the width of back part of thread at the top and bottom, and s the length of the side of thread.

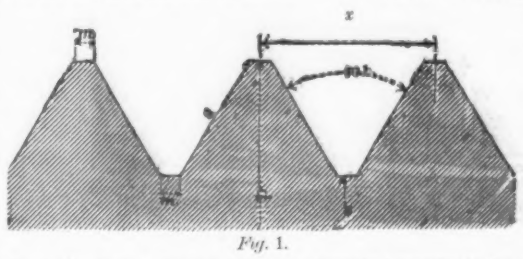

Fig. 1.

From Mr. Sellers' rule the following formulæ can be deduced:

$$n = d - \frac{1{\cdot}299}{v}$$

$$m = \frac{x}{8}$$

$$s = \frac{3x}{4}$$

From this rule any thread can be constructed,

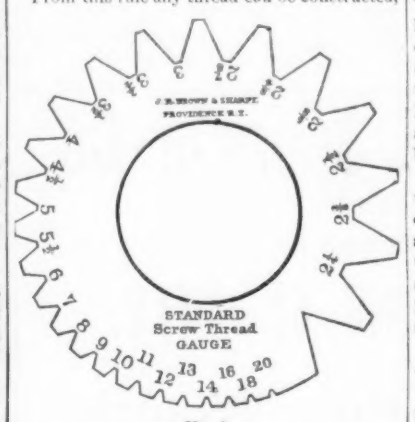

Fig 2.

it being only necessary to know the number of threads to the inch, which, in order to make this description complete, we give below:

Diameter of bolt...	¼	5-16	⅜	7-16	½	9-16	⅝	¾	⅞	1
No. threads per in.	20	18	16	14	13	12	11	10	9	8
Diameter of bolt...	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2		
No. threads per in.	7	7	6	6	5½	5	5	4½		

For practical use Mr. Sellers has devised a very ingenious gauge, to which chasing tools can be fitted for any size of thread. This gauge gives the angle and also the amount to be taken off the point of the tool for any sized thread. For practical use, however, we think that probably the gauge manufactured by the Brown & Sharpe Manufacturing Company, and shown in Fig. 2, will be found the most convenient.

Wherever this standard thread is used, if any pretense at all is made to accuracy of workmanship, careful attention should be given to the form and proportion of the threads as well as to the number to the inch. In buying taps and dies the purchaser should see that they conform in every respect to the standard, and in making specifications for new work similar care should be exercised to secure the true standard, form and proportions of screws. In many shops the workmen who have the care of those tools are entirely ignorant of the peculiarities of the Sellers' system, and have only the vague idea that so long as they get the proper number of threads to the inch they are doing all that is necessary to secure uniformity. Unless, therefore, some care is exercised to insure accuracy of workmanship in this department, the adoption of a "standard" of screws will not ensure the advantages which would result from uniformity of screws and threads.—*Railroad Gazette.*

The Great Bridge at Louisiana, Mo.

A writer in the Louisiana (Mo.) *Press*, of recent date, thus describes the great bridge now in course of construction at that point:

Starting from this side, we first encountered a number of men at work with the steam pile saw, cutting off piles below the surface of the water, for the foundation of the first, or shore pier. This consisted of a circular saw fixed on the end of an upright shaft and run by a steam engine. The frame work was moved along from pile to pile and so regulated as to cut them off on a level. In this manner the foundations for the piers are constructed. The piles are first driven into the bed of the river with a hammer weighing 3200 lbs., worked by steam engines, and these piles are evenly sawed off in the manner described. The caissons are launched and they float immediately over the foundation prepared for their reception, until the weight of the masonry sinks them to their places. The caissons are constructed of heavy pine and oak timbers. A strong platform of square oak timber is first made from two to six courses in thickness; then two courses of pine plank are overlaid, the top course being jointed and tightly caulked. The sides and ends are attached and held together by means of iron bolts and dogs, and after a thorough caulking, a large water tight box is thus secured for the building of the piers. The derricks are next brought into requisition and the dimension stone is lifted from the flat boat and placed by the masons in the caissons. The increasing weight of the pier as it goes up, gradually sinks the caisson until it rests securely on its foundation. The diver is then called upon to make the above described platform or bottom of caisson secure to the pile foundation, which is done with heavy iron drift bolts. The sides and ends, however, are taken off and used again on other occasions. Thus the piers are constructed.

The next place visited was the pivot pier, and that mass of solid stone work, is the principal feature of the entire substructure. It is a model of masonry and bridge architecture. It is almost round, with a diameter of 42 feet at the base and 40 feet at the top. It contains 1200 cubic yards of solid stone—all put up in the incredibly short space of 12 days.

It is underlaid with 120,000, board measure, feet of square timber; 15,000 pounds drift bolts were used in its construction, and the whole "structure of majestic frame" rests on 200 piles. Two rest piers, each, 200 feet from pivot pier, built of oak and filled with rip rap, will support the end of the draw when turned for the passage of boats. A break crib, made of oak, filled with stone and sheathed with iron, will be placed above the upper rest pier. Two floats, each 200 feet long, built of wood and iron, whose ends are made to fit into grooves in the corners of the pivot pier, and respective corners of the corresponding rest piers, are to be constructed so as to rise and fall with the water. These serve for a protection of the main pier to keep out boats, rafts and heavy drift wood. Eleven smaller piers will complete the points of support on which the bridge will rest, and of which four are already completed. There will be eleven spans of the following length: Two draw spans, each 200 feet in clear; one raft span 250 feet; one 200 feet, and seven others 160 feet each. The superstructure will be of iron, and is to be built by the Kellogg Bridge Company, of Buffalo, N. Y., and the Keystone Bridge Company, of Pittsburgh, Pa.

In connection with the bridge are the east and west approaches, the latter having a bridge over Noix creek of 120 feet span, built on stone abutments. This approach extends 500 feet into the river, constructed of heavy embankments and strong rip rap walls, while the east approach is built out 1200 feet in the river with similar embankments.

On the bridge proper 5000 cubic yards of first class masonry, 45,000 cubic yards of rip rap, 180,000 yards of earth in embankment and 5000 piles will be used in the substructure. All the masonry rests on timber foundations sunk four feet below lowest water ever known. A large lot of machinery has been in constant use on the works, among which may be enumerated: 3 pile drivers run by steam engines; 3 derricks for laying piers, also operated by steam engines, and one by horse-power; 8 hand derricks used on shore for handling stone, loading boats, etc.; 20 flat boats for handling dimension stone, rip rap, piles and timber; a divers' boat, apparatus and crew for work under water, and a steam boat for towing.

The cost of the substructure in the aggregate will amount to nearly $300,000. At the present rate of work the whole bridge will be ready for the crossing of trains by the 25th of December.

A Time Recording Clock.—A clock has been invented by an officer of the Western Union Telegraph Company, which at any time will print the year, month, day, hour and minute. It acts either automatically or by hand, as may be desired. This time-printer is worked by an electro-magnet. Use does not impair or effect it as a time-keeper. Behind the dial, which is of glass, and indicates the time, there is an adjustment of wheels and machinery connected with a small battery, and above all a small press, in appearance such as is usually used for cancelling stamps, receipts, and like purposes. By placing at any hour of the day a slip of paper beneath the face of what appears to be an ordinary die, and pressing down the handle, there will appear instantaneously, printed in clear type, the year, month, day, hour and minute when it was done. This acts automatically, needs no regulation, is always correct, being connected with the chronometer which is regulated by the Washington Observatory, does not get out of order, as there is no friction, and it is about to be put into general use. The whole apparatus is not larger than an ordinary mantel time-piece, and is easy to handle. Its advantages are manifold. It is to be used by persons in charge of railway stations, who will be required to obtain an impression of the hour when trains arrive, pass or leave the depot, thus tending to prevent accidents, and to hold the different employes to rigid responsibility, and placing the blame of failure in duty or accidents upon the proper persons. It will secure vigilance on the part of watchmen, who will be required, at intervals during the night, to obtain impressions from the electric time-keeper, and thus give evidence of their fidelity to their trust. It is not possible to manipulate the machine so that it will record other than the correct time, and is a faultless sentinel of the passing hours.

Swedish Iron.—The report published by the Swedish Board of Trade of the export of iron up to the end of August, shows a considerable decline, as compared with the same period of 1872. The following is a comparative statement of the two years:

	1873. Tons.	1872. Tons.
Pig Iron	39,400	49,900
Bar Iron	57,500	79,700
Rods	13,700	13,000
Blooms	5,900	7,700
Totals	116,500	150,300

This falling off is the more remarkable, as the high prices must have stimulated production, and the explanation is doubtless to be found in the fact that all the available stocks at the principal shipping ports had already been disposed of during the preceding year.

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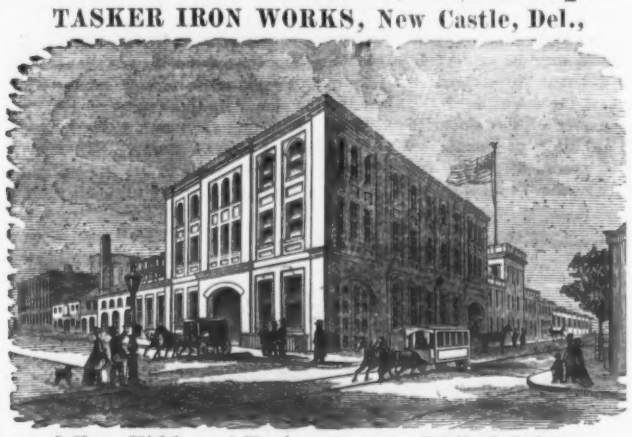

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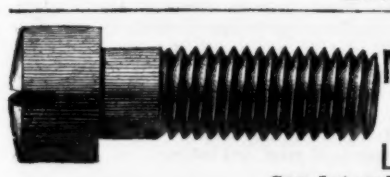

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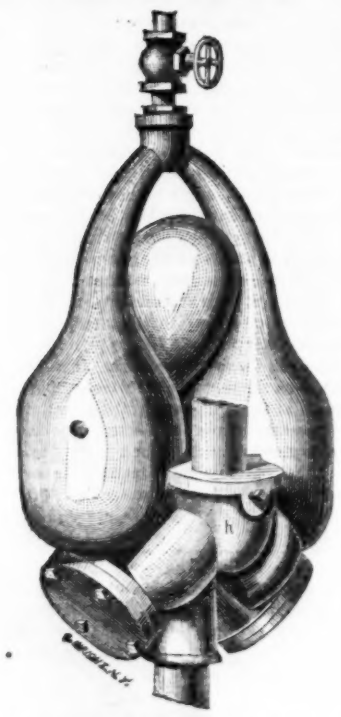

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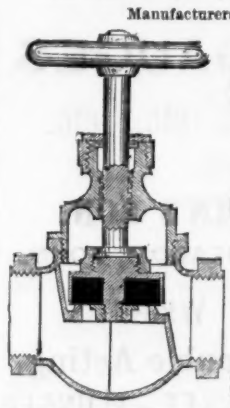

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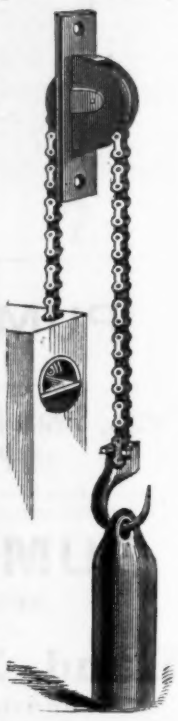

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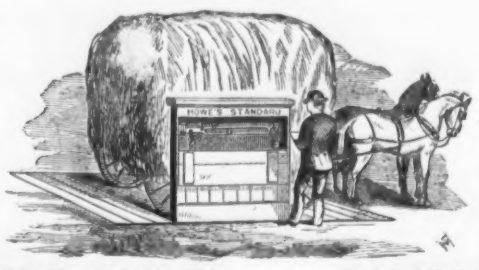

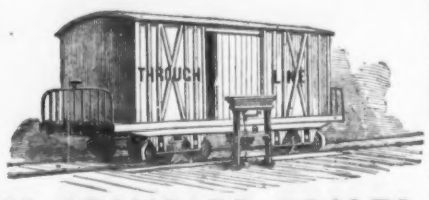

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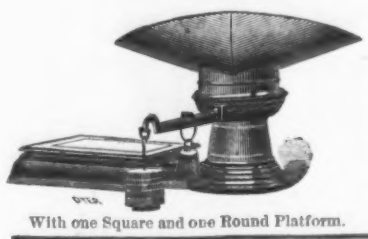

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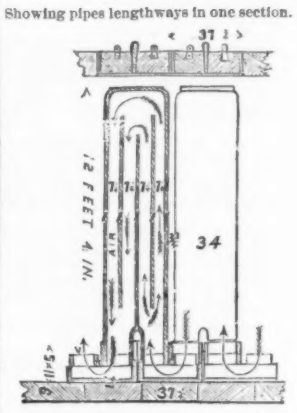
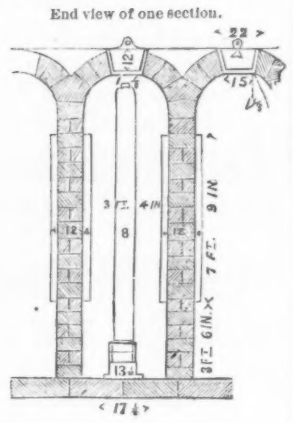
Showing pipes lengthways in one section.



End view of one section.



REFERENCE.

PHILADELPHIA, Nov. 16, 1872.

PAULDING, KEMBLE & CO.:

GENTLEMEN: We have five sections of the "Ford's" Ovens in use since blowing in our new Furnace on the 21st of October. The Ovens have given entire satisfaction; we consider them superior to any Cast Iron Oven in use; they heat the air to a greater degree with much less gas and heat on the brickwork than the Player Ovens; they cost less for construction, and, we believe, will prove more durable, and less expensive to keep in repair. Our main difficulty thus far has been to keep the heat down to 1000 deg.; our average is from 1100 to 1200 deg.

In all cases the Cast Iron Key Boxes to form the arch should be filled in lightly with fire-brick blocks, laid dry and covered with loam, or, *better*, a cast iron plate, to cover the top, with a ring in it, so as to be easily removed.

We built our ovens in one block, entirely of *fire brick;* the cost of the brick work entire was about 5000 dollars, say about 1000 for each oven.

We put 4 courses of fire-brick in the bottom, laid on a loose slate rock, laid dry, and well grouted each course with Kaolin grout.

We can recommend the Ford Ovens with great confidence to iron men who wish to construct the best kind of ovens in use in the United States. Yours, truly, J. B. MOORHEAD & CO.

P. S.—Our Furnace is now on her 3d week, making about 28 tons per day good Foundry Iron—15 feet bosh, 50 feet high.

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OTIS FURNACES & MINES.

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How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO., Wheeling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & Co., New York.

Dear Sirs: The experience of a year proves that ***your Furnace Elevator is superior to all others in use.*** We have in the six weeks from December 1st to Sunday last, 12th inst., made ***2724 tons, 1401 lbs. Pig Metal,*** or an average of near ***65 tons per day,*** which required the elevator to ***lift 72 feet high*** 4½ tons Ore, Coke and Limestone for each ton of metal produced, or ***more than 11,500 tons material in the 6 weeks.*** The largest yield in ***one*** day was ***81 1-4 tons*** Iron, involving the lifting of ***345 tons*** material ***in 24 hours.*** This has all been done to ***our satisfaction,*** and that, too, in the ***coldest weather we have had.*** Other furnaces with ***water*** and ***pneumatic hoists*** have experienced ***great difficulty,*** on account of the ***water freezing*** in the ***tanks;*** and in the case of the ***air*** hoists, we understand that two furnaces, not far from us, ***had*** to ***"blow out,"*** from being ***unable to hoist stock*** during the ***"cold snap."*** The difficulty, we are told, was caused by the ***condensed moisture*** in the ***blast freezing to the sides of the cylinders,*** so that the ***piston could not move*** up or down.

Very truly, yours, DEWEY, VANCE & Co.

Send for Circular to

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348 Broadway, NEW YORK.

BUSINESS ITEMS.

NEW YORK.

Thirty-seven men were discharged by the Erie Railway Company, at Elmira, N. Y., on the 23d instant. Eighteen were employed in the Elmira shops, and the remainder at various points on the Susquehanna Division. The force in that vicinity is now reduced to 120 men, and after Nov. 1 they will begin to work only three-fourths of the usual time. The Pullman Palace Car Company is working 59 men nine hours a day, and the work already ordered will probably keep the force employed during the winter.

Several prominent citizens of Troy propose to erect an extensive iron mill on an island in the Hudson, near that city.

The Remington gun factory, at Ilion, 10 miles from Utica, has orders for all the work it can turn out for two years to come. The company has been seriously embarrassed, however, in obtaining currency to pay off its hands, who number about 1500.

The rolling mill in Rome has been obliged to suspend operations.

NEW JERSEY.

The Danforth Locomotive Works, at Paterson, have retained their full force of employees, and are running seven hours per day. This course is preferred to discharging any of their men.

Out of the 167 men employed in the car shops at Dover, 42 have been discharged, about one-half of whom are Swedes.

PENNSYLVANIA.

The *Genius of Liberty* (Fayette county) says: On the 6th of October Dunbar Furnace completed the third year of the present blast, having made in that time 28,684 tons of pig metal. The make for the last twelve months was 10,701 tons, and of this only 27 tons were white and 63 tons mottled, made after two stops of several days' duration. For the last nine months not one pig of white iron has been made, which speaks volumes for the founder, Mr. Healey. If there is any other furnace that can show more regular running than this, we would like to have their figures for comparison. The ores charged averaged 47 per cent. The monthly make at this time is about 1000 tons, but with more abundant supplies of ore, the expected yield is from 1100 to 1200 tons per month. As far as can be seen the furnace is in perfect order, and good for five years more."

A reduction of ten per cent. in the wages of all the employees of the Pottstown Iron Company was made on the 20th.

The rolling mill at Fishback, which suspended operations a short time since in consequence of the panic, is again partly in operation. The men who were suspended have been recalled, and the manufacture of rails is now going on.

The firm of Bagaley, Young & Co., of the Phœnix Roll Works, Pittburgh, has been dissolved, Mr. Bagaley retiring. The other members of the firm, Messrs. J. B. Young, J. S. Seaman and Robert Sleeth, will continue the business under the firm name of Jas. B. Young & Co.

The Shenango Works, New Castle, resumed operations on the 15th inst.

Murray, Dougal & Co.'s Car Works, at Milton, employ 400 hands, and turn out about 100 cars a month. Both passenger and freight cars are built.

The Harrisburgh Car Works have resumed operations.

The Bethlehem Iron Company have resumed work in their rail mill in South Bethlehem.

The rail mill of Waterman & Beaver, at Danville, has ceased running, owing to a lack of orders. The company have reduced the wages of their puddlers 20 per cent., while the furnace men have been cut down in a like ratio, or on a basis with prices ruling previous to 1866. All the other mills in the same place have followed the example of Waterman & Beaver, and reduced the pay of their workmen in about the same ratio.

MARYLAND.

The Baltimore Bridge Co., in addition to the contract for the new bridge over the Susquehanna at Havre de Grace, for the Philadelphia, Wilmington & Baltimore, has contracts for bridges equal to 11,400 lineal feet of single track. The two principal contracts are the four-track iron approach viaduct to the St. Louis bridge, and the bridge over Red River on the Cairo & Fulton.

The steel works of Messrs. Thompson & Paxton, at Cumberland, are approaching completion.

MASSACHUSETTS.

The Atlantic Car Company, at Salem, has just filled a large order for the New York Central and Hudson River Road. The company is building 12 passenger coaches for the Boston and Maine, and 15 for the Eastern Road, beside 250 coal cars for the Boston, Clinton and Fitchburg Road.

The Taunton Locomotive Works recently shipped four 26-ton locomotives to Montevideo, South America, for the Maronas, Panda and Montevideo Railway. The engines have cylinders 14 by 22 inches, with driving wheels five feet in diameter, and are very highly finished.

Perry Brothers, of Lowell, employ 18 hands in their foundry, where they make all kinds of machinery castings, furnace grates, window weights, railroad supplies, etc. They have a capacity adequate to the production of $75,000 worth of goods a year.

The Bay State Iron Works have suspended operations and discharged 260 men.

CONNECTICUT.

Day's Mill, at Seymour, is now manufacturing a telegraph cable 8000 feet long, and containing 10 insulated wires.

The works of the Union Hardware Company, at Wolcottville, manufacturers of skates, skate straps, dog collars, sheaths, belts, tool handles, mallets, and beer coolers, cover about 20 acres of ground, and give employment to 200 operatives.

RHODE ISLAND.

The American Butt Company has seven or eight brick and stone buildings at Providence, in which it carries on the manufacture of cast butt hinges, beside a variety of general hardware, mostly for the use of builders. The company employ 100 men. From 500 to 600 tons of pig iron are consumed yearly.

MAINE.

The strikers connected with the Pembroke Iron Works, at Eastport, have again resumed work. The cause of the strike was the reduction of their wages by the company. Matters have been satisfactorily adjusted.

The practice of attaching heel and toe plates to boots and shoes has given rise to a new branch of manufacture, which is represented in the establishment of George S. Fairbanks, at North Monmouth. He is the pioneer in this specialty in New England, having begun the business in 1860. His products includes heel and toe plates of brass, steel and iron, which he turns out at the rate of 100 dozen per day. The machinery in his factory, which is especially adapted to his business, and most of which is of his own invention and make, is driven by a never failing water-power. He employs, constantly, 10 hands. His goods are not surpassed in the country, and are sold as fast as they are produced in the New England markets. Their utility has been fully demonstrated by years of trial, and for boots and shoes worn by persons engaged in mines, quarries, etc., they are deemed indispensable. Mr. Fairbanks has built up a prosperous business, which enjoys a rapid and healthy increase.

ILLINOIS.

A Farmers' Co-operative Manufacturing Company has been organized at Lyndon, with a capital of $150,000. The Lyndon Hydraulic Company presents it with lots and water-power valued at $10,000, and it will go into the manufacture of agricultural machinery on an extensive scale.

During September 3100 gross tons of steel were made at the Joliet Bessemer Steel Works.

MICHIGAN.

The Michigan Stove Company, Detroit, with a capital of $150,000, make $30,000 worth of stoves monthly, and give employment to 200 hands.

Mr. S. W. Remer, formerly superintendent of the Atlantic Car Works, at Salem, Mass., is now at Detroit superintending the construction of a number of his patent compartment stock cars. The cars are 36 feet long, and are divided into four compartments holding four cattle each. The cattle can be provided with food and water by levers operated from the top of the car. Ten of these cars will be completed shortly.

Manufacturing at Newark, N. J.

The Newark Daily *Advertiser* reports that the manufacturers of that city are hopeful and confident, although suffering temporary embarrassments from the recent panic. A number of men are out of employment, but many of these were engaged on city improvements, which are now completed. Among the jewelers the stringency of the money market is seriously felt. A number of their employees are now idle, and the manufacturers have small hopes for a better state of affairs for some time. At the Clark Thread Works, where 800 women and 250 men are employed, night work has been necessary for the past two or three weeks. There is no prospect of a curtailment of the operations of the establishment, but it may become necessary to add to the number of operatives now employed. The patent leather manufactory of R. Ward & Co. is now running on short time, and the men are reported as being perfectly satisfied with the change. The firm has been compelled, by the state of the money market, to give its Western customers additional time for settlements. This is the only discouraging feature in their business. The harness and saddle manufacturers report dull times. Some firms are working on half-time, but none have discharged any employees, although in a few instances it has been found difficult to keep them busy. It is believed there is a prospect of much better trade after Jan. 1, as the various manufactories have light stocks on hand at present. The hat trade has been brisk all this season, and more money has been made by those engaged in it than at any other period within the past three years. The present month has been more than usually prosperous. For the past three months many firms in the trade have kept their men at work until 8 o'clock at night. One manufacturer stated that he had been 500 dozen behind on orders for a long time, and that there was a better outlook for the next season than ever. The shoe trade is doing a very fair business, though most of the manufacturers are working on back orders. Most of the houses are employing a full force of hands, though in two or three instances the men are working on three-quarters time. The prospects are dull for November and December. The wholesale clothing manufacturers are doing but little business, and many of them are not employing more than their regular number of men.

The Cambria Iron Works.—We are informed that Hon. Daniel J. Morrell, general manager of the Cambria Iron Works, at Johnstown, Pa., has given notice to the employees that the company finds it impossible to make collections for iron sold, or to sell for cash, or to raise money in any other way to make the usual monthly cash payments, and therefore gives notice to those to whom cash balances are now due that they shall be paid as soon as money can be obtained. He further states that in view of the uncertainty of obtaining orders on any satisfactory basis to keep the works running, it is deemed proper to give notice that "while the company will guarantee to employees all necessary supplies to the extent of their earnings, no regular cash payments need be expected until cash can be obtained for products of the works." Those who are not satisfied to continue work under this arrangement can give due notice, when they will be paid off in full as soon as funds can be secured for the purpose.

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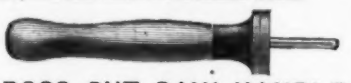

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Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time RUN TRUE. This department is under the personal supervision of myself, who has devoted over *twenty years* to the art of saw making.

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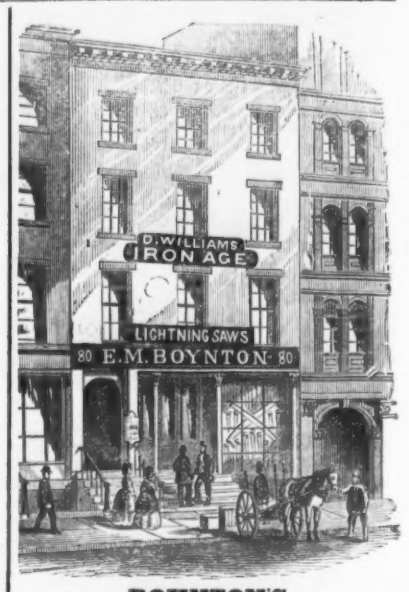

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How Tin Plate is Made in Wales.

The following is an abstract of a paper read before the Franklin Institute, of Philadelphia, on the evening of October 15th, by Thomas S. Speakman, Esq., representative of the Institute at the Vienna Exposition:

In the opinion of Mr. Henry I. Madge, tin plate manufacturer of Swansea, in Wales, from whom received the following information, the manufacturer prefers making his own iron to purchasing it, because he can thereby insure a more regularly equable quality; he therefore buys suitable pig iron.

For common coke tin plates the "iron bars" are made from puddled iron. The puddled ball is sometimes squeezed and sometimes hammered; much depends on the care of the puddler to so bring forward his ball that all its parts shall be equally decarbonized, when the fracture will be of a uniform dull gray color, without crude admixtures of bright crystals. The unreduced crystals produce more or less wasters of the iron plates, and if any such escape the notice of the mill manager, the wasters are thrown aside again, after being expensively covered with tin. If they escape the eye of the "assorter," the tin plate worker will find them to fracture across the angles or bends of the sheets in working them up. The puddled ball produced under the best conditions is then taken to the "shingler," who submits it to the squeezer or hammer, sometimes both. This operation should be carefully executed. As the puddled ball is rugged and full of cinder, the cinder has to be well squeezed out by this operation, and at the same time the roughness must be so managed as to be welded into a solid compact mass, which cannot be so well done in after operations. Some say it cannot be done afterward, as the whole mass can never again be brought up to a thorough welding heat throughout, unless at the expense of much waste and loss. The bloom from the "shingler" is at once passed through the rolls, or roughed down into No. 1 bar; some prefer letting the blooms lie exposed to the action of the elements for a time, and others think it of no importance. The bar while hot is cut into lengths and piled, five pieces being put and heated together in the "balling" furnace, or repeating. When the faces are brought up to a welding heat, and the whole mass softened, it is again taken to the hammer (some rolling at once), others returning the bloom into the furnace, to bring up the heat again. It is then rolled out into the finished bar, of suitable size and thickness for the kind of plates required.

Some manufacturers have made very good iron from the puddled ball direct, and saving in wasters and improving the quality, but as the labor and number of hands were reduced by this mode, the men struck against it, and spoiled their work if not well looked after. This kind of iron was homogeneous, and not fibrous, as the iron "piled" and brought through the reheating furnace. The "shingler" must be very careful to form a second bloom under the hammer, and the bloom should be upset once or twice, so as to secure a welding of all the rough edges. If, after the shingling, the bloom has lost too much heat, it should be reheated. Care and expedition will remedy that necessity, and the reheating furnace may be dispensed with altogether. The saving is much in cost and waste; the trouble with the workmen great. Some also produced very excellent iron from the puddling furnace by adding to the charge about 60 pounds of scrap or shearings, the trimmings of the plates when cut to size. The 60 pounds of shearings were thrown into a bath of saturated solution of nitrate of soda, and added to the charge during the "boiling." The advantages gained were: the scrap iron improved the charge in the proportion it bore to the whole mass; it was melted down quickly without waste, as the smelting took place under the surface. The weight of solid cold iron would take it to the bottom of the charge, carbon would be eliminated by fusion with the nitrate, and thereby improve the quality of the charge again. The ball was afterward treated in the same way as ordinary puddled balls. The iron was tough as charcoal iron, but possessed the characteristics of puddled iron, arising from crudities, for unreduced crystals were not exterminated, but greatly reduced. A careful puddler can at all times prevent these crude lumps to a very great extent. Another saving arising out of the process was that the scrap "shearing" formerly put into a furnace and reduced to a welding state, hammered out and rolled, gave only a return of 13 cwts. to the ton, whereas the other returned the full weight of the shearings. Difficulties with the union men prevented them from pursuing this mode of manufacture.

THE TIN MILLS.

The bars are cut up into the required sizes, brought to a cherry-red heat in a reverberatory furnace, rolled out to a certain length by gauge, "doubled" and returned to the furnace, re-rolled, again doubled, heated and re-heated. The several foldings of the sheets adhere slightly. After the sheets are cut down to size for tinning they are separated from each other by what is called opening. During the process of opening "stickers" and imperfect plates are thrown out, and the passed sheets then go into the "pickling room." There they are put into a hot pickle of dilute sulphuric acid, to be cleansed from oxidized and silicious matters, and undergo another rough examination in the "scouring process;" that is, any plate not cleansed is rubbed with sand and water. Defective sheets are again thrown out, and the sheets or plates are now passed into the

ANNEALING ROOM.

The annealing furnace is a large reverberatory furnace capable of holding several annealing pots. The pot is composed of a stand of sufficient size to take the sheets, with a raised rim. Several hundred sheets are piled on the stand, and a square, box-shaped cast pot completes the pot. This is inverted over the sheets, and the space between the rim of the stand and the rim of the inverted pot is filled with oxide of iron, to lute it down and exclude the air. The pots are then put into the furnace until it is full, and the whole brought up to a cherry red heat, or a little beyond. About eight hours are necessary for its perfect saturation by the heat. When removed from the furnace they are slowly cooled in a place free from draft, and then the pots are opened. The plates never lie perfectly flat, and should be of a dark straw color at the edges. If the air should get in in small quantities a deep blue color will cover the sheets more or less. The plates adhere slightly, are again separated, and ready for the second pickling room. The plates are then submitted to a hot, but more dilute, pickle of sulphuric acid, and again chemically cleansed; taken from the acid bath, they are well washed in running water, and kept in clean water until the tinman is ready for them.

THE TIN HOUSE.

The tinman takes the plates from the water bath (where they lie some hours) and plunges them wet into a bath of hot palm oil called the "grease pot." When they have acquired the temperature of the grease pot, they are removed with tongs and quickly submerged in a bath of tin. The oil mixed with the water from the plates floats at the top, forming a flux to cover the melted tin and prevent oxidation. With the tongs the sheets or plates are continually kept moving and separated, to insure the tin getting between all of the sheets. When the bath has recovered its heat, which it generally does in about half an hour, the tinman examines the charge, and finding that perfect amalgamation has taken place between the two metals, he removes them, in quantities convenient, with a tongs to the next bath, which is kept at a low temperature.

The temperature raised by the change from the "tinpot" is again allowed to cool down to a few degrees over the melting point of the tin, when the plates are taken in lots of a dozen or two at a time, and laid on an iron slab which is at the side, or head of the pot. The waste metal and grease run back into the pot, the slab being inclined. The workman then takes up sheet by sheet in the tongs, and dips each into another bath of fine metal kept at a heat little over melting point, immediately withdraws it, and places it in a rack immersed in a large pot of melted palm oil kept at the proper temperature, where they are allowed to remain a certain time. The sheets are then slowly lifted out of the grease by a boy, who separates them into proper lots by counting carefully, regulating the intervals of time between them. The grease recoils from the top plate, and, as little is left on the sheets, they are again placed on a rack in the open air to cool; when cool a lad takes each sheet in a tongs, and dips the lower edge into a small bath of melted tin, so regulated that the sheet can only enter to about the eighth of an inch. It is kept long enough to melt off the drops of metal which adhered to the lower edge, and when lifted the sheet is struck to throw off the superfluous metal from the edge. The plates are again put into a rack, and taken while warm to a bin of bran, where each sheet is thrust into and under the bran, to get rid of the grease which adheres. It is then passed on to a second and third hand, when the grease is pretty well left behind in the last bin, which is kept filled with new bran. The sheets are turned out covered with flour dust and bran, and dusted off with cotton shaggy cloth. The next process is in

THE SORTING ROOM.

The finished sheets are laid on tables, and each sheet undergoes an examination by the sorter, who throws out those shearings which are defective in the iron or trimmings. The latter are reheated to regain the tin; the imperfect sheets are sold as "wasters" at a less price; the sheets are counted, and the box of one cwt. is composed of 225 sheets of 14x10, for home use or for exportation.

NEW METHOD OF BURNING COAL.

The same gentleman also communicates the following information concerning a new method of burning bituminous coal in England:

During my stay in England I witnessed, on a most extensive scale, a new system of burning bituminous coal, and other kinds of fuel, which rendered the combustion so perfect as to prevent the generation of smoke, thus effecting an economy of from 35 to 40 per cent. in the cost of fuel. It is an American invention, and the following is a minute description of the apparatus employed and its principles of working. It consists of a blast from a fan or blower introduced under the fire grate into a tight fitting ash box, which, passing through the fire, is met at its upper surface by a back atmospheric pressure, created by one or more pipes, descending from that point of the furnace where the heat and smoke usually escape into the chimney. To create a back pressure, as before described, the downward pipes are employed. The air from the fan or blower meets this back atmospheric pressure in the body of the fire, and produces a heat and combustion like that from an ordinary blow pipe, so perfect as to prevent the generation of smoke. All the combustible matter of the coal or other fuel being consumed, nothing escapes except the residuum, carbonic acid, and nitrogen gases, which, if permitted to remain, would extinguish the fire. To avoid that difficulty, by freeing the furnace from such incombustible residua, the pressure of the fan is somewhat greater than the back atmospheric pressure, thus keeping up a slight circulation from the furnace into and through the down pipes, as above described, which enables the heat usually escaping from the top of chimneys to be utilizedby water in a tank, in which these pipes, or the succession of down pipes, are immersed, the water thus heated affording addtional economy in the process.

This invention, owing to the present high prices of coal in Europe, is likely in time, from its great economy in fuel, to revolutionize almost every department of trade, and the smoke which usually escapes into the open air in all manufacturing districts being prevented, will no doubt add greatly to health, convenience, and cleanliness wherever it is used.

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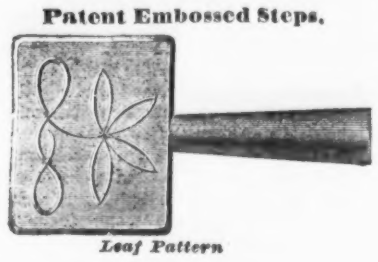
Patent Embossed Steps.

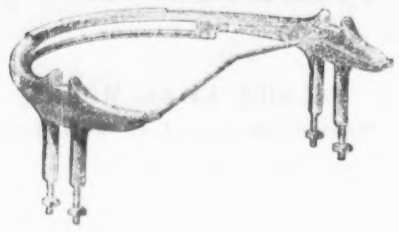


Leaf Pattern

King Bolt Yokes.

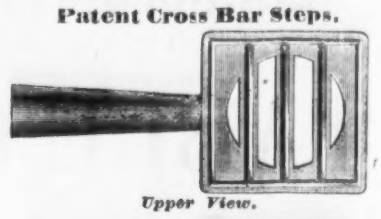
Established 1850.

No. 6 Fifth Wheels.

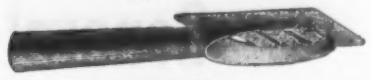


1871 Pattern Shaft Couplings.

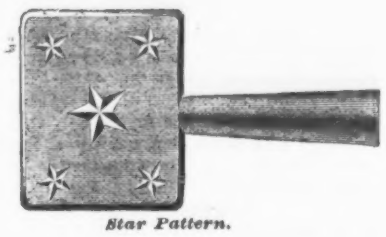
Patent Cross Bar Steps.



Upper View.

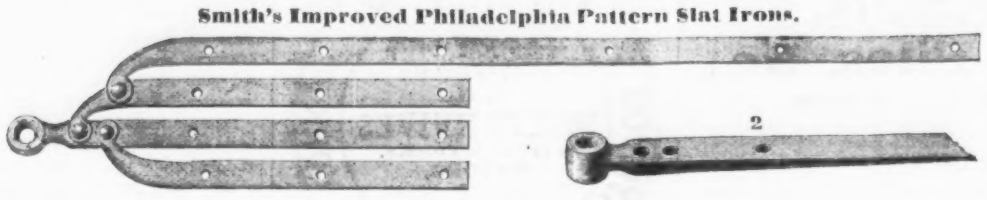


Lower View.

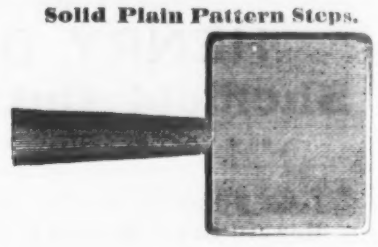


Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



Solid Plain Pattern Steps.



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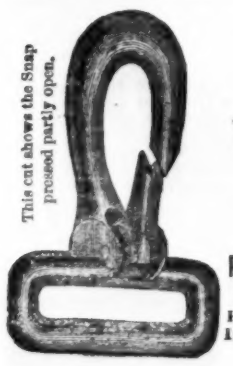

This cut shows the Snap pressed partly open.

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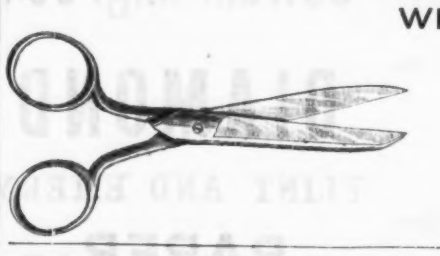

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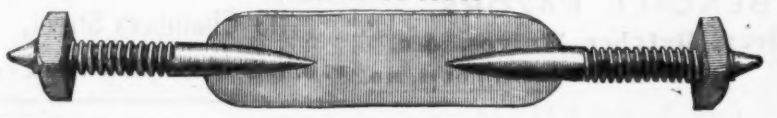

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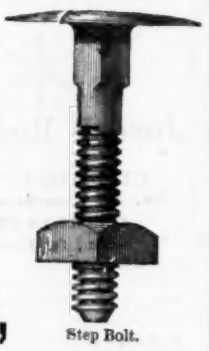

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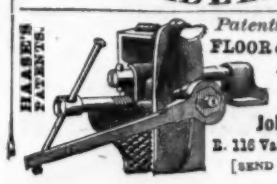

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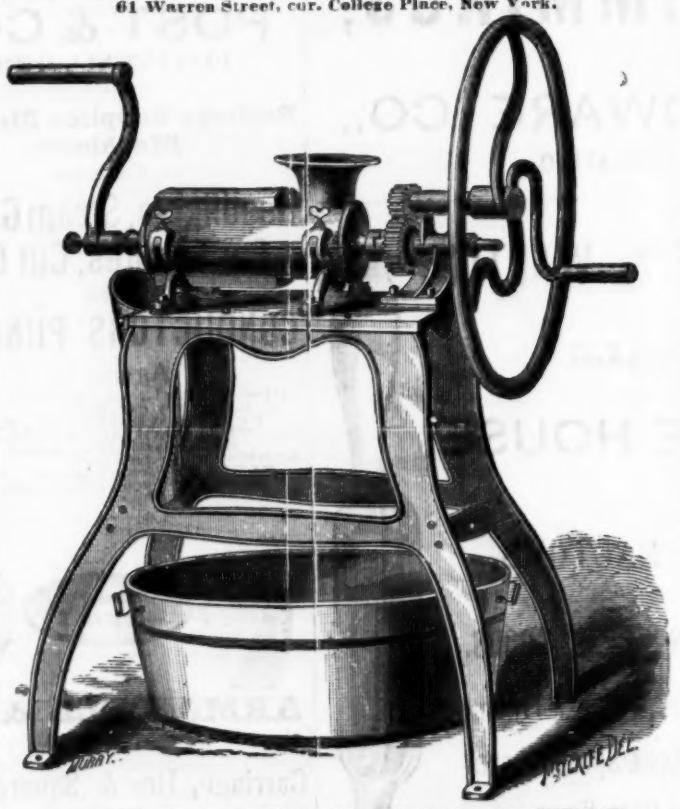

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A perforated steel plate, with its surfaces ground perfectly true, is placed near the outlet of the Machine and prevents the meat from leaving it until it is cut to the proper degree of fineness. This is regulated by the size of the holes in the steel plate, through which the meat must pass before being discharged.

Separate revolving knives, fitted for that particular purpose, shear close to steel plate, on each side of it, and, as the meat passes through the holes in the plate, cut perfectly fine all the strings which may chance to get past the other knives.

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Modern Steel.

We condense the following from an interesting paper by Mr. W. H. Barlow, C. E., F. R. S., read before the Mechanical Section of the British Association:

It is not alone in tools and machinery that this country has attained a high position; it stands pre-eminent, also, in the utilization of waste or incidental products, and in the production of new materials. At the present time there are more than 500,000 tons made by the Bessemer process alone, added to which Messrs. Siemens' works, at Landore, produce 260,000 tons, beside further quantities which are made by his process at Messrs. Vickers', Messrs. Cammell's, the Dowlais, and other works. The steel produced by the Bessemer process was at a very early stage employed in rails and wheel tires. In both these applications the object sought was endurance to resist the effects of wear, and toughness to prevent fracture by blows. There does not exist at present sufficient information to determine accurately the relative values of steel and iron when used for these purposes. As used for wheel tires, steel had to compete with iron of the highest quality, but it is nevertheless introduced on most of our railways. The iron used in rails was not of such high quality, and the difference in duration shows a very marked advantage in the employment of steel, the duration of steel rails being variously estimated at from three to six times that of iron. Steel is also extensively used for ships' plates, and by the War Department for lining the interior of the heaviest guns; while Sir Joseph Whitworth and Messrs. Krupp make guns entirely of steel, though for these purposes the metal is of different quality and differently treated, in order to withstand the enormous concussions to which it is subjected. And, further, we have steel used in railway axles, crank axles for engines, in boilers, in piston rods, in carriage springs, and for many other purposes. But notwithstanding these various employments of steel, there has been, and there continues to be, a difficulty in applying it to engineering structures in this country. In 1868 a committee, composed of Mr. Fowler, Mr. Scott Russell, Captain Galton, Mr. Berkley, and myself, undertook to conduct a series of experiments upon this subject. The first experiments were made for the committee by Mr. Kirkaldy with his testing machine, in London, to ascertain the relation between the resistances of tension, compression, torsion, and transverse strain. In this series of experiments 20 bars, 15 feet long, were used, each bar being cut into lengths, and turned or planed into suitable forms for the respective tests, so that a portion of each bar was subjected to each of the above-mentioned tests. The tensile resistance varied in the different qualities of steel from 28 to 48 tons per inch, and the experiments established that the relation subsisting between the several resistances is throughout practically the same as in wrought iron: that is, wrought iron will exhibit about the same relative increase of resistance under the other tests. They further showed that the limit of elasticity in steel is, like that of wrought iron, rather more than half its ultimate resistance. The second series of experiments were made by the officers of the gun factory at the Royal Arsenal, at Woolwich, and show a remarkable increase of strength obtained by the process of tempering steel in oil and water. This property of steel is now fully recognized and made use of in the steel which forms the lining of the largest guns. The third series of experiments were made by the committee upon bars 14 feet long, 1⅓ inches in diameter, with the skin upon the metal as it came from the rolls, to ascertain the modulus of elasticity, with the testing machine at H. M. Dockyard, at Woolwich. Bars of iron of like dimensions were also tested in the same way, in order to obtain the relative effects in steel and iron. In these experiments 67 steel bars were tested, whose tensile strength varied from 32 to 53 tons per inch, and 24 iron bars, varying from 22 to 29 tons per inch. The amount of the extensions and compressions were ascertained by direct measurement, which showed that the extension and compression of steel per ton per inch was a little less than wrought iron, that the extension and compression were very nearly equal to each other, and that the modulus of elasticity of steel may be taken at 30,000,000, which result agrees with the conclusion arrived at by American engineers on this subject. The fourth series of experiments were made by the committee on riveted steel, and show clearly that the same rules which apply to the riveting of iron apply equally to steel; that is to say, that the total shearing area of the rivets must be the same, or rather must not be less, than the sectional area of the bar riveted. Taking Mr. Kirkaldy's experiments, in conjunction with those made by the committee, there is a great range of strength due to the different qualities and make of the steels tested, and must not be mistaken for irregularity of strength in the manufacture. In applying steel to engineering structures we may dismiss those superior qualities which are of high price and made in comparatively small quantities. I propose, therefore, to confine my observations to the mild steels, such as are made by the Bessemer, the Siemens-Martin, and other processes, having a tensile strength varying from 33 to 36 tons per inch, and of moderate cost. Following the same rule as is adopted for wrought iron (namely, that the maximum strain on the metal shall not exceed one-fourth of the breaking weight), we may consider steel of this quality capable of bearing at least eight tons per inch, instead of the five tons per inch estimated for like purposes in iron. The limiting span in iron, with a strain of five tons to the inch upon the metal, is about 600 feet; and it follows that a steel girder of like proportions, capable of bearing eight tons to the inch, would have theoretically a limiting span of 960 feet. This would, however, be reduced by some practical considerations connected with the minimum thickness of metal employed in certain parts, and it would, in effect, become about 900 feet. Assuming a load in addition to the weight of the girder of one ton to the foot, the relative weights under these conditions would be as follows:

Span.	Weight of steel girder. Tons.	Weight of steel girder. Tons.
200	57	100
300	150	300
400	320	800

Again, taking such a case as that of the Menai Bridge, which consists of two spans of 500 feet over the navigable waterway. This structure is composed of four wrought iron tubular girders, each weighing about 1500 tons, or 6000 tons in all; and in order to avoid the difficulties of scaffolding, each of these tubes was built on the shore, floated off on pontoons, and lifted bodily into its place by hydraulic machinery. If this work had to be constructed now, and was made an open girder of steel instead of plate iron, the weight of metal required would be little more than one-third of that used, and the cost of erection, the time required for its execution, and the total cost of its construction would be most materially reduced. It will naturally be asked why it is that steel is not used in these structures if such manifest advantages would result from its employment? The reason is twofold: 1st. There is a want of confidence as to the reliability of steel in regard to its toughness and its power to resist fracture from sudden strain. 2d. Steel is produced of various qualities, and we do not possess the means, without elaborate testing, of knowing whether the article is of the required quality for structural purposes. A third reason, is that in the regulations of the Board of Trade relative to railway structures, although rules are given for the employment of cast iron and wrought iron, steel has not, up to the present time, been recognized. Of "Bessemer steel" 18 samples were tried under tensile strain, the length being 50 inches and the diameter 1·382 inches; and when these were subjected to ultimate strain, the elongation at the moment of fracture was in the most brittle example 2¾ inches, but generally varied from 4½ to 9½ inches. In the experiments on transverse strain, the bars being 2 inches square and only 20 inches between the supports, all the "Bessemer steel" samples, except two, bent 6 inches without any crack. Again, in experiments on bars 14 feet long and 1⅓ inches in diameter, out of 20 bars of the milder quality of steel, 16 extended more than 8 inches, and of these 10 extended more than 12 inches. As to the malleability of steel, I may mention that I have seen a piece of rail, weighing 80 lbs. per yard, and 12 feet in length, held by one end and twisted at the other, until it made 6¾ revolutions before it broke at one end, leaving about 11 feet of the rail in the twisted form which had been given to it. In this twisted state the rail was laid on two bearings 3 feet 6 inches apart, and subjected to the blow of one ton weight falling 30 feet, and it bore one of these blows without breaking. I have also used a considerable quantity of steel rails, the test to which they were subjected being one ton falling 20 feet on a 3 feet 6 inch bearing, and out of the whole number tested there was not one which broke with this test. The effect of the blow was to produce a set of about 2½ inches; and if the rail was then reversed and struck on the other side, it became nearly straight again. As a rule, the rails yielded to the third blow; but I have seen seven blows given without producing fracture. On the other hand, five of the bars tested by the committee were of inferior malleability. It is known that in the Bessemer process, if ores or metal of suitable chemical qualities are used, and the process of manipulation is properly performed, the quality of metal produced is certain and regular in its results. In the processes of Dr. Siemens there is not the same necessity for purity in the ore or metal, the nature of the process being such as to eliminate some of the ingredients which would prevent toughness being obtained, while tests may be made during the process of manipulation so as to ascertain that the metal is of the quality sought before it is run off into the ingot mold. Where large castings and metal of great solidity are required, as in making large guns, there is the method persued by Sir J. Whitworth, whereby the metal is intensely compressed while in a fluid state. The pressure employed is 20 tons per inch, and its effect in producing solidification is such as to shorten the ingot about 1½ in. for every foot of length. By this process mild steel can be made with a strength of forty tons to the inch, having a degree of ductility equal to that of the best iron. The more highly carbonized qualities, whose strength range from 48 up to 72 tons per inch, show a degree of ductility somewhat in the same ratio as the strength increases. There are small arms made entirely of steel, of wonderful range and accuracy, capable of penetrating 34 half-inch planks, which is about three times the penetrating power of the Enfield rifle. Secondly, there are the large guns, also entirely of steel, throwing projectiles from 250 lbs. to 310 lbs. in weight, and burning from 40 to 50 lbs. of powder at a charge with which a range of 6½ miles is obtained. In both these cases the degree of strength and toughness required in the metal is much greater than is necessary for engineering structures. It is well known to manufacturers that steel of the strength of 33 to 36 tons per inch can be made and is made in large quantities at moderate price, possessing all the toughness and malleability required in engineering structures. Chemical analysis is not in itself a complete and sufficient test of quality in steel. The toughness of steel may be altered by sudden cooling, so that we cannot rely entirely upon the aid of the chemist, but must fall back on mechanical tests. Now there are two descriptions of mechanical testing, which may be distinguished as destructive and non-destructive. The destructive test is that usually applied to a part of an article manufactured, as, for example, a piece cut off a boiler plate and tested by absolute rupture, or by bending. The non-destructive test is that usually applied to the finished work, as in the test of a boiler by hydraulic pressure, or the testing of a gun by the proof charge. The strain in this case is made greater than that which will arise in the daily use of the article, but is not so greatly in excess as to be beyond the elastic limit of the material. It may be said that engineers may ascertain for themselves, by inspection and testing at the works, that they are being supplied with the material that they require; but assuming that the tests and mode of testing were in all respects satisfactory to them, and that the metal supplied was of the right quality, we have still to comply with the conditions prescribed by the Act for the Regulation of Railways, and we must satisfy the government inspector. It is not to be supposed that he can attend all the required tests at the works; and the question remains, how is the inspecting officer of the Board of Trade to be enabled to distinguish the quality of the metal in a finished bridge, when he is called upon to give a certificate that it is safe for public traffic? The difficulty lies in the want of something whereby the quality of the metal may be known and relied upon with confidence by others beside those who made the article. As the rule made by the Board of Trade in respect of wrought iron railway structures may not be generally known, I here give it: "In a wrought iron bridge, the greatest load which can be brought upon it, added to the weight of the superstructure, should not produce a greater strain on any part of the material than five tons per inch." It will be observed that this five tons per inch is the governing element, irrespective entirely of the quality of metal used; and it is obvious that a rule so framed must act as a discouragement to any endeavor to improve the quality of metal, while it tends to induce the employment of the cheapest and most inferior description which can be made under the name of wrought iron. I feel bound to say that I do not consider the Board of Trade is alone responsible for the position in which the question now stands; and, as regards the Government Inspecting Officers, I can only say that in the numerous transactions I have had with them, and although differences of opinion have occasionaly arisen, yet, considering the responsibility which rests upon them, I have found them anxious to afford all reasonable facilities so far as their instructions permitted. The first step to be taken is to put our testing on a systematic and satisfactory basis. The second is to establish some means whereby metal which has been tested can have its quality indicated upon it in such a manner that it can be practically relied upon. The experiments before referred to establish, sufficiently for all practical purposes, that the relation or proportion between the resistances or tension, compression, torsion, and transverse strain is about the same in steel as in wrought iron. The testing required is, therefore, reduced to that necessary for ascertaining two properties only, namely, the strength and the toughness or ductility. The strength may be readily ascertained, and no difficulty arises on that head. The whole question turns upon the test for ductility, or the resistance to fracture by blows or sudden strain; and it must be admitted that the tests employed for this purpose are not framed on any regular or satisfactory basis. I may mention, as an example, the test of rails by a falling weight. In the first place, as usually applied, it is made a destructive test, the weight and fall being such as to bend and render the rail unfit for use, however good its quality may be. Secondly, being a destructive test, it is applied only to one or two per cent. of the quantity; and if this amount bear the test, the remainder are assumed to be like them. Except in cases of accident, when an engine or train leaves the line, rails of the weight now used in permanent way are never known to be bent by the passage of trains, but brittle rails will break. The weight on the driving wheel of a large engine is about eight tons; the amount of vertical fall in passing along the line is necessarily very small; and we know by experience that this large weight with this small fall is sufficient to break inferior rails, while it leaves the good ones unbent and uninjured. What we require of the test by impact is that it should be so arranged as to do what the engines do, detect the brittle rails without destroying the good ones; whereas, as now applied, it destroys 1 or 2 per cent. of the rails submitted to the test, however good they may be, while it gives no information whatever regarding the remaining 98 or 99 per cent. of the quantity. Another test for toughness or ductility which is very useful is the extension of the metal beyond the limit of elasticity. In testing his fluid compressed steel, Sir Joseph Whitworth employs this test upon a piece of the metal six inches in length. For a length of two inches at each end a screw is cut for the purpose of enabling the hydraulic apparatus to bring the strain to bear on the sample. The remaining two inches between the screwed portions is accurately turned down until the sectional area is exactly half an inch. The sample is now subjected to strain, and the recorded extension occasioned by the strain at the moment of rupture is treated as percentage or proportion of the two inches between the screws, and is described as the percentage of ductility. But it is obvious the measure of ductility so obtained has reference to the particular length and dimensions of the specimen, and would be altogether varied if a long bar were tested instead of a short one. There is, however, another evidence of ductility which, within certain limits, is independent of length—that is, the diminution of sectional area which takes place at the point of rupture; and the ratio which the original sectional area of the bars bears to the sectional area of the fractured end appears to afford a more definite measure of ductility. Thus, in the experiments of Mr. Kirkaldy, previously referred to, it appears that in bars 50 inches long and 1·382 inch diameter, the sectional area of the factured end was, in some cases, less than five-tenths of the original section. In the bars broken by the committee, which were 14 feet long and 1⅓ inch in diameter, it was in the best samples under six-tenths, while the best qualities of wrought iron, similarly treated, showed a ratio of about five-tenths. Such a degree of ductility as is presented by these samples is not needed in engineering structures, the wrought iron frequently used for these purposes being of much less ductility. What is required for this test is a definite basis to act upon, and that the samples should be so made as to render the test cheap, expeditious, and easy of application. The next requirement is that when a piece of metal has been tested, and its qualities of strength and toughness ascertained, there should be some means of denoting its quality in an authentic manner. To a certain extent this is already done in iron by the mark of the maker; but something more than this is necessary to fulfil the required conditions in steel. What is termed steel, is iron with a small proportion of carbon in it. These two ingredients are necessary to constitute steel; and there may or may not be present in very small quantities graphite, silicon, manganese, sulphur and phosphorus. In conection with the experiments made by the committee, 14 of the samples were tested by Mr. E. Richards, of the Barrow Steel Works, five of which were kindly repeated by Mr. Odling. Although there are some discrepancies in the results which we cannot account for, yet some of the characteristics are brought out clearly. It appears that manganese may be present to the extent of four-tenths per cent without injury either to the strength or ductility, but sulphur and phosphorus, except in extremely small quantities, are fatal to ductility. All these materials are called steel, and have the same external appearance; but possessing, as they do, such a range of strength and such a variation in ductility, it becomes absolutely essential that there should be some classification or means of knowing the respective qualities among them. From the want of such classification many professional men regard the material as altogether unreliable; while large consumers of steel seek to establish works on their own premises and make their own steel. This step has already been taken by one of the large railway companies, and is, as I am informed, contemplated by one of the principal constructive departments of the government. My attention has been recently and forcibly directed to the importance of steel through having been called upon, in conjunction with Mr. Bidder, Sir John Hawkshaw, Mr. Harrison, and Dr. Pole, to report upon the magnificent work designed by Mr. Bouch for crossing the Firth of Forth. This great work consists of a stiffened suspension bridge in two spans, each 1600 feet between the supports. To construct this work in iron, with a working strain of five tons to the inch, would involve such weights of material and magnitude of strain as to render it virtually impracticable; but in tough steel, capable of bearing eight tons per inch, it is practicable to accomplish it, and even larger spans. Mr. Bouch has designed the chains of this bridge to be made of steel; and in addition to the honor which must attach to his name as the originator of this great and important work, he is further entitled to the merit of being the first engineer to break through the restrictions which confine our engineering structures to wrought iron, and to brave the difficulties which surround the employment of steel for railway works in this country. In consequence of the impediments to its employment in England, very few English engineers turn their attention to the use of steel. They are accustomed to make their designs for iron, and when engaged in works abroad, where the Board of Trade rules do not apply, they continue for the most part to send out the old fashioned ponderous girders of common iron, in cases where the freight and difficulties of carriage make it extremely desirous that structures of less weight and more easy of transport should be employed. In conclusion, I would observe that we possess in steel a material which has been proved to be of great capability and value; we know that it is used for structural purposes in other countries, as for example, in the Illinois and St. Louis bridge in America, a bridge of three arches, each 500 feet span; yet in this country, where "modern steel" has originated and has been brought to its present state of perfection, we are obstructed by some deficiency in our own arrangements, and by the absence of suitable regulations by the Board of Trade, for making use of it in engineering works.

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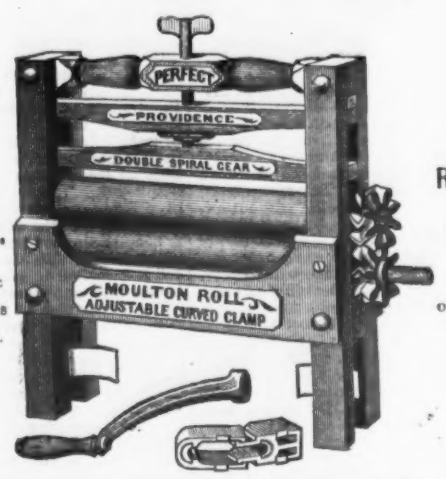

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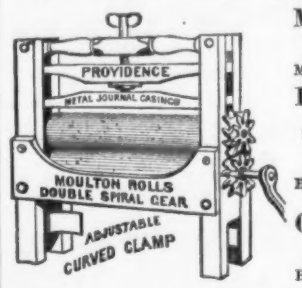

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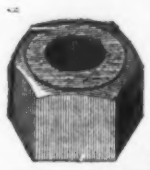

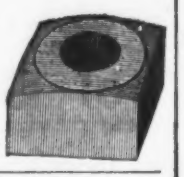

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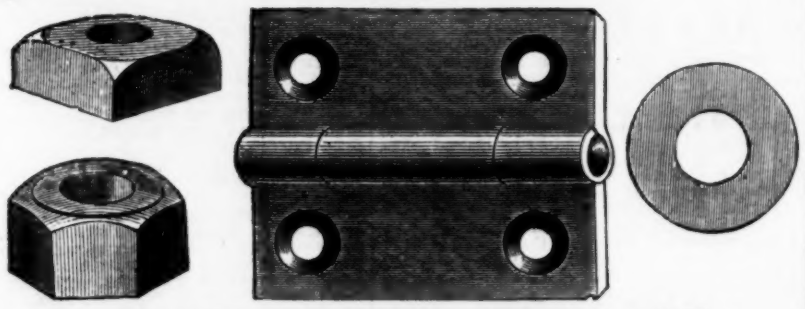

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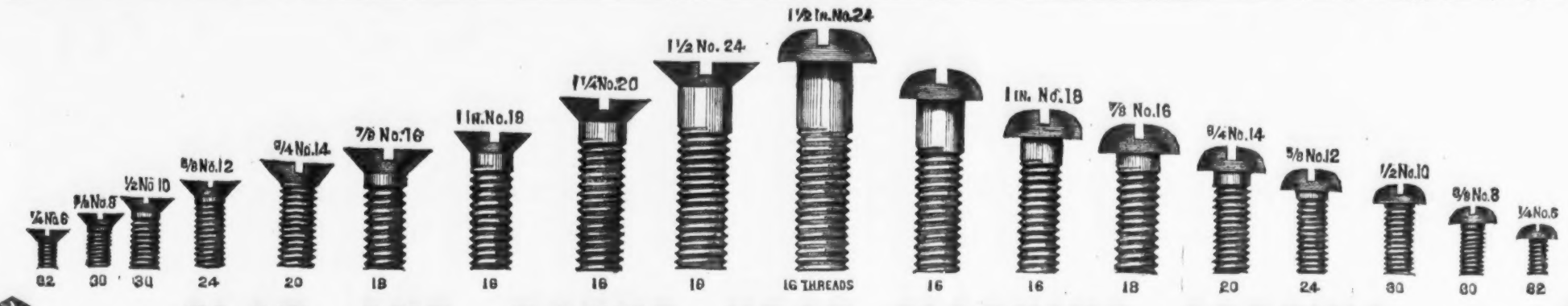

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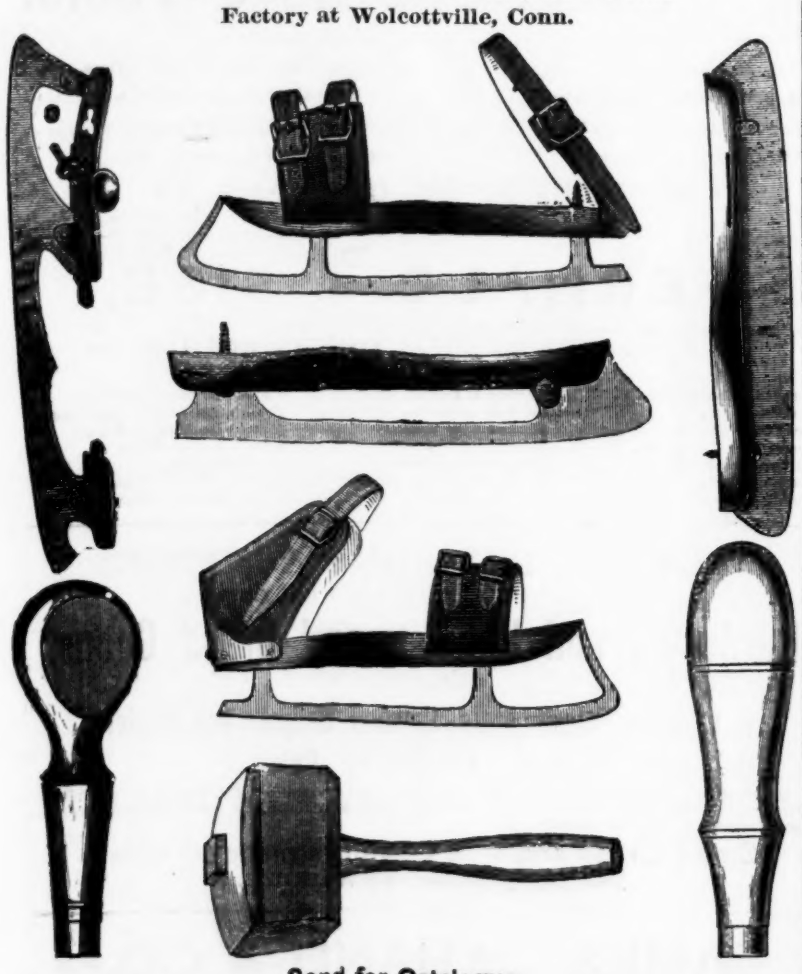

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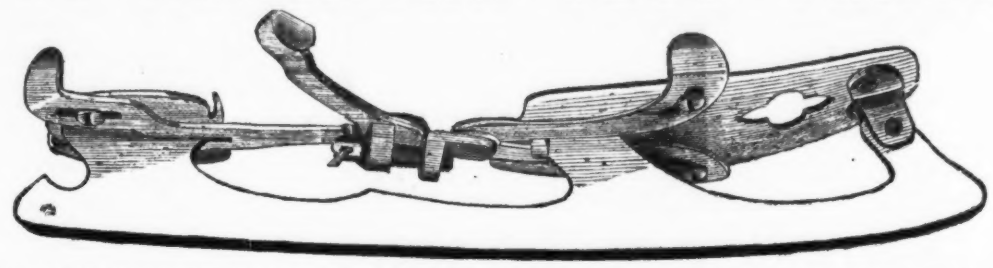

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We would call the particular attention of Dealers and Skaters to the above Skate. After the severest tests for the last two years, and the universal satisfaction it has given, we can confidently recommend it as the only perfect Self-adjusting Skate now in market. No Heel Plates being required, it is readily fitted to any boot, by simply turning the set screw, and when once adjusted is always ready for use. It is locked or unlocked in an instant by the motion of the lever, and forms a firm and reliable fastening, which cannot loosen in the least while skating. These Skates are made in a superior manner, of the best welded and tempered steel, and being simple and durable in construction, must become very popular. *EVERY PAIR WARRANTED.*

Price Per pair, Full Polished Tops.....$3·00, Net.
" " **Blued** " ..... 4·00, "

THE CLIPPER CLUB SKATE.

Price Per pair, Blued Tops.....$3·00, Net.
" " **Polished Tops**..... 3·75, "
" " **Nickel Plating on all Styles of Club Skates**..... 1·50, "

On orders for 100 pairs of the above styles during the season, **25 Cents a Pair less will be charged. New York Agents for WINSLOW'S WOOD TOP and BARNEY & BERRY'S CLUB SKATES.** Send for our Catalogue, and send your orders early.

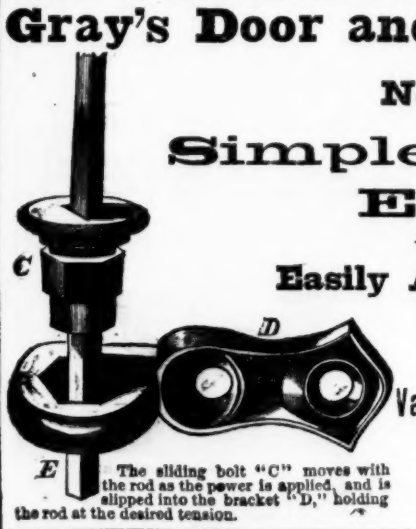
PECK & SNYDER,

Manufacturers of SKATES AND SKATE STRAPS,

126 Nassau Street, New York.

Gray's Door and Gate Spring.

No. 2.



Simple, Effective AND **Easily Adjusted.**

The sliding bolt "C" moves with the rod as the power is applied, and is slipped into the bracket "D," holding the rod at the desired tension.

MANUFACTURED BY

Van Wagoner & Williams,

27 Park Row, N. Y.

Get Binders FOR THE IRON AGE.

We have made arrangements to furnish Koch's PATENT BINDER, which we think altogether the best before the public, to our subscribers at the following very low rates—about the wholesale prices by the dozen.

Half Cloth.....$1·00 each.
(Cloth Back and Corners, with Morocco Paper Sides—a good, serviceable Binder.)
Full Cloth..... 1·50 "
(Morocco Cloth Back and Sides.)
Half Roan..... 1·75 "
(Roan Back; Cloth Sides.)
Half Morocco..... 2·00 "
(Morocco Back and Corners; Cloth Sides.)

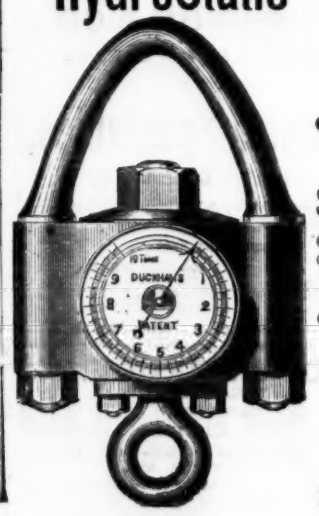
The above are all in black, which is the most serviceable color, with the exception of the Half Morocco, which are put up in a number of handsome shades. The name of the paper is stamped in gold on either side, and each Binder is furnished with loops by which it can be hung up against the wall as newspaper files are usually disposed of.

The Binders will each hold the twenty-six numbers in the form of a bound volume. They can be nicely inserted in two or three minutes by any boy of ordinary intelligence; and when the covers are full they can be either preserved in that shape as bound volumes of *The Iron Age*, or they can be emptied and used again. There is no possibility of their getting out of order, unless the cords, which are very strong, wear out, when anyone can easily replace them with a piece of fishing line or other suitable string. Subscribers who value the paper should order them at once, so as to keep the paper in good order

On receipt of the price we will ship them, safely put up, by any express line or to any New York house to be packed. They are too large to be sent by mail.

DUCKHAM'S PATENT

Hydrostatic Weighing Machines AND DYNAMOMETERS,



Capable of Weighing from 10 Cwt. to 100 Tons and Upwards.

Some purposes to which it can be applied.

(FIRST.)—As a Weighing Machine generally.
(SECOND.)—For ascertaining the correct weight of materials before, and continuously during manufacture at the furnace, cupola or forge.
(THIRD.)—As a Dynamometer, to test the strength of Anchors and Cables; the strain on Ropes or Structures; the power of Machinery; the Traction Power on Land and Towage Power at Sea.

THOS. PROSSER & SON,

15 Gold Street, New York,

Sole Agents for Manufacturer in United States.

THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent *Increment Cut*, an invention owned and controled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point*, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will *not* be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "*Increment File*" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no *regular Travelers*, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

NICHOLSON FILE COMPANY,
Providence, R. I.

CAUTION.

It has just come to our knowledge that certain parties in the West are engaged in buying up WORN OUT FILES of our manufacture, and, after immersing them in an acid bath, selling the same in packages which have a label of the same color and general appearance as ours, and falsely stating as follows:

NICHOLSON FILES,

Providence, R. I.

Increment Cut.

Made from Best English Steel, &c.

Our friends and the public are cautioned against this deception, which we consider one of a most injurious character, not only to ourselves, but to all dealers and consumers who desire the

"NICHOLSON" FILES

as we produce them, as files so treated are comparatively valueless for use.

We have taken steps to have the parties thus engaged in deceiving the public, and trading upon our reputation, presented to the Courts for treatment, and will thank our friends having information bearing upon this subject to notify us, promptly, of any parties who have sold, or are offering for sale, "Nicholson" files doctored and labeled as above described.

Nicholson File Co.,

W. T. Nicholson, Agent.

Providence, R. I., Sept. 25th, 1873.

All packages of NICHOLSON FILES leaving our works bear a label on green paper like the one herewith attached.

1816. *H. F. F.*
1844. *H. F. F. & SON.*
1850. *P. A. F.*
1868. *P. A. F. & CO*

PETER A. FRASSE & CO.,

95 Fulton Street, New York,

IMPORTERS OF

Stubs' Steel Wire, Files and Tools,

Grobet Swiss Files,

Extra Quality English Spring Steel Wire,

Nos. 1 to 34.

Steel Wire for Sewing Machine Needles and for other Purposes,

French Cold Rolled Sheet Steel,

Sizes, 22 to 36 Gauge.

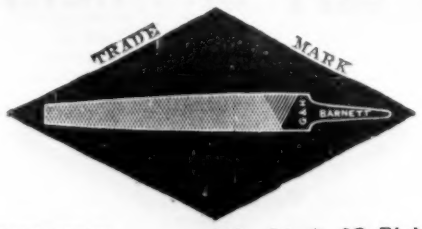
Jewelers', Engravers' & Mechanics' Tools.

The only Agents in the United States for

HUBERT'S CELEBRATED FRENCH EMERY PAPER.

For Hatters' and Machinists' Use.

Black Diamond File Works.



G. & H. BARNETT, 39 41 & 43 Richmond St., Phila.

THE OHIO COAL HOD CO.

MANUFACTURE

MARKLAND'S PATENT ALL WOOD BOTTOM

COAL HOD,

437 East Front Street, Cincinnati, O.

These Hods are far superior to the old style of *All Iron* Hod, as the bottom and foot is made of *one piece of light and tough wood*, which will not *rust, split, break*, or become *ragged* in the foot or rim, like the old style, and there is not the *least* danger of punching holes through or knocking the bottom out. With ordinary care, we will guarantee the **GALVANIZED All Wood Bottom Hod** to last five years. Have known them to last seven years, and still remain in use.

F. G. HOLTON & CO.,

MANUFACTURERS' AGENTS

AND DEALERS IN

Hardware Specialties,

124 Walnut St., Cincinnati, O.

Branch Warehouse for W. & B. Douglas' Pumps and Yale Lock Manufacturing Co.

REPRESENTING

Star Tool Co.,	Schweitzer Mfg. Co.
Maltby, Curtis & Co.,	Lakin Mfg. Co.,
Woods Cutlery Co.,	R. E. Dietz.
Phillips Mfg. Co.,	Houchin Mfg. Co.

Eastern prices guaranteed. Orders solicited.

GEO. W. BRUCE,

No. 1 Platt Street,

Continues to import

Nettlefold & Chamberlain's,

IRON AND BRASS SCREWS, AND WIRE GOODS, RIVETS, &c.,

and assures the trade that his stock, assortment and prices are not equaled by any other parties, whatever their pretentions.

NEW YORK, April 1st, 1873.

LANE, GALE & CO

SOLE AGENTS

FOR

TROY WRO'T BUTT CO.S Wrought Iron Butts (Riveted Pin).

THE EAGLE SQUARE CO.'S Steel and Iron Squares.

E. F. HURD'S AXES, HATCHETS, ADZES, &c., &c.

G. T. LANE'S PLANTERS' HOES.

AGENTS FOR

BURDEN'S HORSE and MULE SHOES.

E. W. GILMORE'S STRAP and T HINGES.

SCOVIL MFG. CO.'S BRASS BUTTS.

J. M. KING'S STOCKS & DIES.

McCREA'S SHOE THREADS and TWINES.

G. F. ELLS' CURRY, CATTLE and PLANTATION CARDS.

ENAMELED and TIN WARE, &c., &c., &c.

TROY. N. Y.

PENNSYLVANIA FILE WORKS.

McCAFFREY & BROTHER,

Manufacturers of FIRST QUALITY FILES and RASPS ONLY,

Nos. 1732 & 1734 North Fourth Street, Philadelphia, Pa.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,	Axes and Hatchets,
Bush Hooks, all patterns,	Grub, Garden & Planters' Hoes,
Turpentine Tools, all kinds,	Mill Picks, Mattocks & Picks
Coopers' Tools, a specialty,	Box Scrapers & Chisels,
Ship Carpenters' Tools,	Cotton Hooks & Samplers.

N. WEED. 37 Chambers St.

FERNALD & SISE,

100 Chambers Street, NEW YORK,

HARDWARE MANUFACTURERS' AGENTS,

REPRESENT:

Reading Hardware Co.	Barnes & Deitz.	Underhill Edge Tool Co.
Crooke & Co.	Nashua Lock Co.	Plumb, Burdict & Barnard.
Yerkes & Plumb.	Arcade File Works.	Hotchkiss, Tuttle & Co.
Hartje, Wiley & Co.	William McNiece.	Klein, Logan & Co.
Vulcan Horse Nail Co.	Langstroth & Crane.	T. T. Rhodes.
Walsh & Bro.	Keystone Manufacturing Co.	Orleans Scythe Stone Co.
Moran & Sons.	A. E. Young.	Lakin Manufacturing Co.

TURNER, SEYMOUR & JUDDS.

MANUFACTURERS, IMPORTERS AND DEALERS IN

Hardware and Upholsterers' Brass Goods.

SOLE AGENTS FOR

L. L. Davis' Patent Levels, Stevens' Calipers and Dividers,

Page's Auxiliary Jaws.

Manufacturers of Judds', Prindle's and Combination Patent Curtain Fixtures, Locks and Curtis' Patent Raisin Seeder, Patent Twine Boxes, Picture Nails and Hooks, Escutcheon Pins, Coat and Hat Hooks; also Miscellaneous Iron and Brass Goods.

Small Brass and Iron Castings made to order.

64 Duane Street, NEW YORK.

JAMES C. HAND & CO.,

COMMISSION MERCHANTS,

No. 614 & 616 Market Street, **PHILADELPHIA.**

AGENTS FOR:

William Penn, Reading and Norristown Pig Iron.
Reading Iron Co.'s (Crescent Brand) Nails, Boiler Flues, &c.
Bar Iron, Plow Steel and Iron, South Easton Iron Wire.
Wm. Jessop & Sons' Steel and Norway Nail Rods.
Barrows, Savery & Co.'s Hollow Ware Castings, &c.
Fisher & Norris' "Eagle" Anvils and Vises.
Washington Mills Emery.
Heavy Hardware, &c., &c.

W. F. SHATTUCK & CO.,

113 Chambers and 95 Reade Street, New York.

MANUFACTURERS OF AMERICAN HARDWARE.

Coes & Taft's Pat. Wrenches.	Mouse Traps. Wire Seives.	Yaw's Cow Bells.
Axe, Pick, Sledge & Hammer Handles.	Scale Beams. Patent Tap Borers.	Axes, Picks and Hatchets. Hammers. Crow Bars.
Hatchet, Auger, Chisel & File Handles.	Tool Chests. Climax Horse Collars.	Sad Irons. Boring Machines.
Mallets. Pat. Boot Jacks.	Brundage Horse Nails.	Cast Iron Hatchets
Gimlets and Gimlet Bits.	Maguire's Wr't Iron Goods.	Coffee Mills.
Augers and Auger Bits.	Shattuck's Platform Counter Scales.	Star Steel Spoons.
Cocoa Nut Dippers.		Stocks and Dies.

The Durability and Preservation of Iron Ships, and on Riveted Joints.

BY SIR WILLIAM FAIRBAIRN, BART., F. R. S.*

The disaster which happened to the Megæra is first discussed, as showing the need of constant inspection of iron structures. That vessel was built by the author of the paper in 1849, and, in his opinion, would have been perfectly sound at the present time if her interior had been freely open to inspection, and if such inspection had been regularly carried out. Some years ago an alarming report was circulated as to the corrosion of the Menai bridge. The author on that occasion visited the bridge, and found that no corrosion had taken place, careful attention to proper means of prevention having been sufficient to preserve the structure. The proved value of periodical inspections in the case of steam boilers is then alluded to, and the author urges the importance of similar inspections of iron ships by the admiralty and by private shipowners.

As respects riveted joints, the author first discusses the relative merits of machine and hand riveting, and points out that in machine riveting there is much greater security that the rivets properly fill the rivet holes. The rate at which riveting can be done is given as 16 rivets per minute with a lever riveting machine, 10 rivets per minute with a steam riveting machine, and 0·66 rivet per minute when the riveting is done by hand.

EXPERIMENTS ON RIVETED JOINTS.

The author alludes, first, to the series of experiments on riveted joints, which were communicated by him to the Royal Society in 1850. Those experiments showed that, taking the strength of a solid plate at 100, the strength of an equal width of riveted joint would be 70 if the joint were double riveted, and 56 if the joint were single riveted; in other words, 30 per cent. of strength is lost in a double riveted joint, and 44 per cent. in a single riveted joint. Since that time it has appeared to some engineers that the process of punching was injurious to the plates, and in many cases recourse has been had to drilling to form the rivet holes. On this point the author was of opinion that with good iron no sensible injury resulted from punching the rivet holes; on the other hand, with rigid and bad plates, the plate would crack between the rivet holes, and the plate would have to be discarded. He regarded it as a distinct advantage of the punching process that it thus tested the quality of the iron. It had been found in certain cases that the rivets sheared across with a less force when in drilled than when in punched holes, and this had been attributed to the sharpness of the edges of the drilled holes. This point seemed to require investigation, and experiments to elucidate it had, therefore, been made, the results of which are narrated in the paper. The theory that the sharp edges of drilled holes induced a cutting action, which diminished the strength of the rivets, had suggested to Colonel Inglis, R. E., to try whether a greater resistance in the joint could be obtained by purposely rounding the edges of the rivet holes. Some experiments had been made for Colonel Inglis by Mr. Kirkaldy, from which it appeared that the resistance of the rivet was increased 10 per cent. by this rounding of the edges of the rivet holes. The author has also experimented on this point, and the results of his experiments are given in the paper.

A series of tables of experiments are then given, each result being fully discussed. The following table is a summary of results obtained by the author:

EXPERIMENTS ON THE ULTIMATE RESISTANCE OF RIVETS TO SHEARING.

No. of experiments.	Diameter of rivet, in decimals of an inch.	Sectional area of rivet, in decimals of a square inch.	Shearing resistance of rivet, in tons.	Shearing resistance, in tons per sq. inch.	Elongation of joint, in decimals of an inch.	REMARKS.
1	.750	.442	19·528	44·170	.190	Single shear, punched holes, machine riveted.
2	.750	.442	19·606	44·346	.272	" " punched holes, hand riveted.
3	.750	.442	19·514	44·140	.195	" " drilled holes, machine riveted.
4	.750	.442	20·269	45·850	.195	" " drilled holes, hand riveted.
5	.750	.442	21·281	48·144	.270	" " drilled, edges of plates rounded, machine riveted.
6	.750	.442	21·195	47·950	.240	Single shear, punched and countersunk, hand riveted.
7	.750	.442	19·584	44·307	.160	" " drilled and countersunk, machine riveted.
8	.750	.442	21·276	48·130	.288	" " drilled, edges rounded, countersunk, hand riveted.
9	.750	.442	34·270	77·530	.190	Double shear, punched, hand riveted.
10	.750	.442	34·174	77·312	.240	" " drilled, hand riveted.
11	.750	.442	34·423	77·876	.323	" " drilled, edges rounded, and countersunk, hand riveted.
12	.750	.442	30·191	68·300	.....	(This rivet did not shear. The plate broke away.)

The general conclusions drawn by the author from his experiments are as follows:

1. Joints with drilled holes are weaker and elongate less before fracture than joints with punched holes. The average of four experiments on joints with drilled holes, compared with the average of four experiments on joints with punched holes, shows that the rivets in the former are 1·36 tons per square inch, or 6½ per cent. weaker than the rivets in the latter. The elongation is also 26 per cent. less with drilled than with punched holes.

2. Hand riveted joints are somewhat stronger than machine riveted joints. The mean of three experiments on hand riveted joints, compared with the mean of three experiments on machine riveted joints, shows an excess of shearing resistance in the rivets in the hand riveted joints amounting to 1·495 tons per square inch, or 7¾ per cent. The hand riveted joint also elongates 26 per cent. more than the machine riveted joint.

3. There is a decided increase in the strength of the rivet when the edges of the rivet holes are rounded, so as to diminish their cutting action. The mean of three experiments on joints with rounded holes, compared with the mean of three experiments on joints with unrounded punched holes, and with the mean of three experiments on joints with unrounded drilled holes, gives the following results:

		Shearing resistance of rivet.
Rounded holes		21·517 tons per sq. in.
Unrounded "	punched	20·468 " "
	drilled	19·238 " "

This shows that the joint with rounded holes is, as regards the resistance of the rivet, 12 per cent. stronger than the joint with drilled holes, but only 2¾ per cent. stronger than the joint with punched holes.

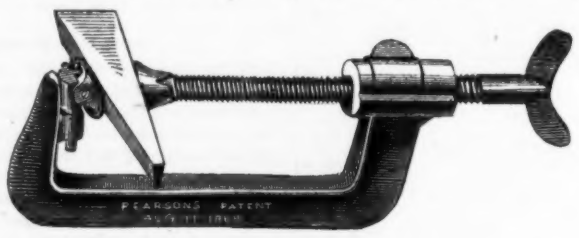
As regards the apparent superiority of hand riveting as compared with machine riveting, the author observes that this is due to the fact that in hand riveted joints the rivet is slightly hardened by being hammered after it is cold. In small experimental joints hand riveting has, therefore, a slight advantage in strength; but the defects of hand riveting are not likely to be exhibited in experiments on a small scale.

The experiments seem conclusive as to the inferiority of joints with drilled holes; and the author reiterates his conviction that the force used in punching plates is a valuable practical test of their quality, and tends to prevent the use of inferior iron.

* Proceedings of the Royal Society, Vol. xxi, 259

Pearson's Patent Clamp.

The accompanying illustration shows the construction of a clamp which the Providence Tool Company are introducing. It is simple and durable, the frame being made of malleable and wrought iron. The thread through the nut is cut in such a way that if the nut is turned to the right, as in the cut, the threads are thrown in gear, and if turned to the left the threads are thrown out, and the screw can be pushed in either direction, to fit any object, when one turn of the screw will tighten it, thus saving much of the time required to adjust a fixed screw. For prices, see Trade Report.



PEARSON'S PATENT CLAMP.

A proposition is to be brought before Congress to connect all the outlying light-houses on the coast by sub-marine telegraphic cables with the main land, and thence with headquarters at Washington. In this manner, it is argued, not only could the Lighthouse Board be assured at all times of the efficiency of its employees, but the movements of vessels could be watched and reported, saving millions of money for the benefit of commerce.

Th American Iron Works, and Wharton's Bar Mills, at Pittsburgh, suspended operations on Saturday. It is expected both establishments will be again opened in a few days. Porter & Co.'s mills were also closed the same day, but it is not known when they will be opened again. At Oliver & Co.'s works the wages of laboring men have been reduced from $9 to $8 a week. The glassware trade on the South Side is also in a depressed condition, many of the mills being idle, with little hope of an early resumption of work.

There are signs of growing dullness in the stove manufacturing business at Troy and Albany. Some of the large foundries are running on full time, but most of them are reducing their production and hours of labor. Trade is fairly active, but the market is pretty well supplied, and the want of currency, rather than the prospects of a dull trade, may be assigned as the cause of such stoppages as are already announced.

Special Notices.

DAYTON & LAMBERSON'S
(Copyrighted Revised Lists.)
DISCOUNT BOLT LIST.
Book form, Common and Philadelphia Lists, 20 discounts
DISCOUNT SCREW LIST.
On Card Board or Paper, 13 discounts.
Single copy, $1·00; two or more, 75 cents each.
Mailed, in perfect order, prepaid on receipt of price. Address FRANK DAYTON, 83 Duane St., N. Y.
GENTLEMEN: Your Discount Screw and Bolt Lists are just the thing; no Hardware man can afford to do without them. We take pleasure in recommending them to the trade. A. OZMUN & SON.
Rochester, Minn.

TO IMPORTERS.
An importer now doing business in this city, who has an experience of over 20 years, wishes to make an arrangement with some out of town house, either in any of the adjacent cities or the West, to act as their agent in this city, and to give his whole time to the purchases and shipments of goods bought here, and the passing of goods imported through custom house. Compensation a stated salary, or a commission, as may be decided upon. Best of references given. Address, "IMPORTER," *Office of The Iron Age*, 10 Warren St., N. Y.
NEW YORK, Oct. 16, 1873.

Special Notices.

THE ATTENTION OF MANUFACTURERS AND business men is called to the natural advantages of Bristol, Bucks County, Pennsylvania, for a manufacturing site, situate on the River Delaware, with a river front of over one mile, navigable for vessels drawing 15 feet water, 18 miles from Philadelphia, on the line of the New Jersey Division, Pennsylvania Railroad, between Philadelphia and New York, and at the terminus of the Delaware Division of the Lehigh Canal, by which coal and iron are brought to our town cheaper than at any other point between New York and Philadelphia.

Bristol is noted as being a very healthy place, with cheap homes and low rents, good public and private schools, six churches of different denominations, and several manufacturing establishments already established. It contains a population of over 5000, and is constantly increasing in size and population.

Believing that Bristol possesses advantages that few other towns possess, and that the attention of manufacturers need only be diverted in this direction, the Burgess and Council have enacted the following ordinance, viz.:

Be it ordained and enacted, by the Burgess and Council of the borough of Bristol, and it is hereby ordained and enacted by the authority of the same, That all manufactories which shall be erected within the borough of Bristol, during the period of ten years from and after the passage of this ordinance, shall for and during said period be exempted from the payment of borough tax.

Enacted into an ordinance at the Council Chamber, this fourteenth day of July, A. D. 1873.
CHARLES E. SCOTT, Burgess.
Attest: J. WESLEY WRIGHT, Clerk.
BRISTOL, Pa., July 21, 1873.

Translations and Condensations.
The undersigned, commercial Editor of *El Cronista* the Spanish Government paper in this city, and Foreign Editor and Translator of the *Daily Bulletin*, has made it a specialty for years past to translate industrial matter, with the strictest adherence to the technical wording, from and into English, German, Spanish and French, for manufacturers, patentees and others, and begs to be recommended to the iron masters and trade in that capacity.
C. KIRCHHOFF, Box 2806, Post Office.
Latest Publications translated by C. KIRCHHOFF. "German Imperial Consular Instructions." "Cuba may become Independent." Officially endorsed by the governments of Germany and Spain.

THE
CANADIAN BANK OF COMMERCE.
Capital - - $6,000,000, Gold.
Surplus - $1,500,000, Gold.
The New York Agency, No. 50 Wall Street, buys and sells Sterling Exchange, makes Cable Transfers, grants Commercial Credits, and transacts other Banking Business.
J. G. HARPER, J. H. GOADBY, } Agents.

STERLING
IRON & RAILWAY CO.
MAKERS OF
STERLING ANTHRACITE PIG IRON
FOR FORGE AND FOUNDRY USE.
A. W. HUMPHREYS, Treas.,
42, PINE ST., N. Y.

To Furnace Men and Malleable Iron Manufacturers.
For Sale or to Let.—The McHaffie Steel Co.'s Works, at Lamokin, on the P. W. & B. Railroad, at its junction with the Baltimore Central, comprising Foundry, Annealing Furnaces, Machine, Blacksmiths' and Carpenters' Shops, &c., &c. These Works are most eligibly located, and with ample facilities for doing a large business. Parties desiring such property are requested to apply in person at the Works, or by letter addressed to The McHaffie Steel Co.," Chester, Delaware Co., Pa.

MANUFACTURERS
desirous of introducing their goods to the **British** and **Continental** Markets, are advised to insert advertisements in the newspaper **"IRON,"** published every Saturday, at *99 Cannon Street, London, E. C.*
SCALE: First 3 lines, 3/; every additional line, 10d. Price, 6d. per Copy, or 30/ per annum, inclusive of postage to the United States.

R. T. HAZELL, AUCTIONEER.
By R. T. Hazell & Co.,
Store No. 118 Chambers Street.
Our REGULAR SALES of HARDWARE, CUTLERY, FANCY GOODS, &c., will be held on TUESDAYS and FRIDAYS throughout the season.
CASH ADVANCES made on CONSIGNMENTS without additional charge.

"ENGINEERING,"
A Weekly Illustrated Journal, edited by W. H. MAW and JAMES DREDGE.
OFFICES, 37 Bedford St., Strand, London, W. C. 52 Broadway, New York.
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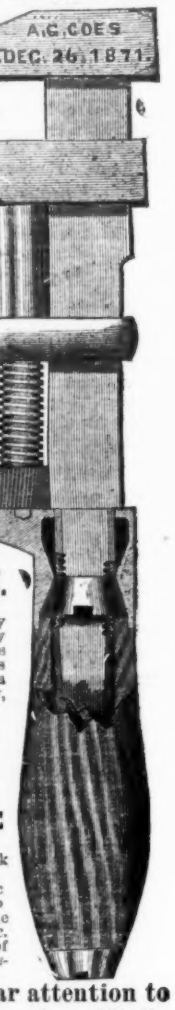
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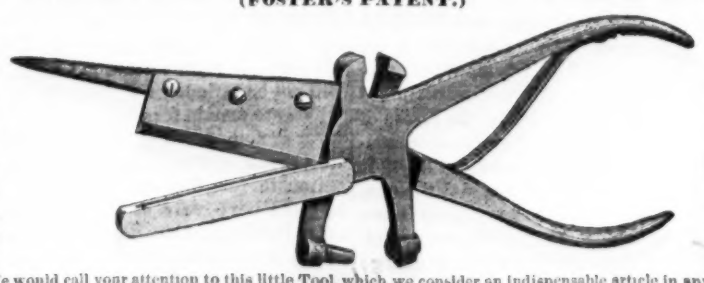
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The Iron Age.

New York, Thursday, October 30, 1873.

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JOHN S. KING . . . . Business Manager.

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The Outlook for Manufactures.

Two weeks ago, when the public alarm had in some degree subsided, and evidences of a re-establishment of confidence were seen on all sides, there was warrant for the belief that our principal manufacturing industries would tide over the panic and its consequences. Our abundant crops, the active foreign demand for our food products, the success of our efforts to build up an export trade in manufactures of various kinds, and the general prosperity of the country, were sufficient reasons for believing that there existed no necessity for a general suspension of manufacturing operations, and this opinion was entertained by those best able to forecast the future of trade and to estimate the probable consumptive requirements of the country. It must be confessed, however, that the consequences of the panic have been more serious and far-reaching than was anticipated, and while we see no reason to change our opinion that there is nothing in the conditions affecting the general prosperity of the country to force manufacturers to restrict their production of staple commodities, the difficulty of obtaining currency for wages and current expenses, of making collections and of obtaining the customary advances of either money or negotiable paper from commission houses, have forced manufacturers to curtail their operations or to suspend altogether. These partial or complete suspensions are by no means limited to the iron trades. On the contrary, the iron works have held out remarkably well, and while many—perhaps a large proportion—of the rolling mills are running on part time or standing temporarily idle, comparatively few furnaces have been blown out, notwithstanding the fact that the condition of the market for pig iron is not such as to offer much encouragement to continue running. In other branches of manufacture, including those which give employment to the greatest number of laborers, and which contribute most to the wealth of the country, the embarrassment seems to be quite as great as in the iron trades; and while manufacturers are confident that no cause, save the lack of money, exists to compel a curtailment of manufacturing operations, they nevertheless are compelled to yield to the force of circumstances, and to close their establishments until confidence is restored, the banks gain strength and the money now hoarded returned to circulation. The situation is somewhat anomalous, it is true, but the facts are as we have stated them, and no immediate improvement can be expected, although it is probable there will be a gradual and sustained recovery from the depression which now exists, and that before the close of another month a fair proportion of the establishments now idle will be running as actively as is usual at this season of the year.

But should the worst fears of continued stringency and depression be realized, the difficulties which have forced the suspension of so many manufacturing establishments cannot last much, if any, beyond the close of the year. Everything points to an active and profitable spring trade, and as there are no great accumulations of staple goods of any kind in the market, our manufacturers will be taxed to meet its demands. That the iron trade will share in a marked degree the general improvement, cannot be doubted. During the past year there has been the greatest economy in the consumption of iron, owing to the high prices for pig iron which were maintained by the furnacemen until midsummer, and to the unwillingness of buyers to purchase beyond their immediate requirements when the decline began. Had makers manifested more readiness to meet the views of buyers, and not endeavored to maintain the price of pig above its value, they would have done better for themselves, and disposed of a great deal of iron which they are now compelled to carry, or sacrifice at prices below the cost of making it. We warned them nearly a year ago that their policy was a mistaken one, and that it would result in serious injury to trade; but experience teaches wisdom where precept fails to convince, and we have no need to enforce the lesson learned in this instance by any comments of our own. As to the price at which iron will open next year, it is impossible at this time to form any definite opinion. Some predict that No. 1 pig iron will go as low as $30 before January ; others, as well informed, and whose opinions are equally entitled to consideration, fix the price between $35 and $40. It is probable, in any event, that iron will open at a price at which makers will generally refuse large contracts, and so low as to afford a basis for a continuously profitable and active trade, with gradually advancing prices. It is also probable that there will be an active speculation in iron next spring, and as consumers who do not also make pig iron for market are generally without stocks, they must buy largely when they buy at all. We have no means at hand of estimating, with any degree of confidence, the amount of stocks now held by makers, but, though large and increasing, we do not believe them to be so great that they will not all be needed, with current production included, for consumption or export before the close of 1874. We see nothing in the situation or outlook to shake our faith in the future of American iron, nor to threaten a serious check to the rapid and sustained development of our iron making and manufacturing industries. In our last issue we gave our reasons for believing that the falling off in the consumptive requirements of the railroads will not be seriously felt, since the market is likely to remain for a long time to come in favor of domestic rails and against those of foreign manufacture, and there is no good reason to fear that as much iron will not be used next year as last for purposes other than the construction and equipment of railroads. Altogether, the outlook is favorable for iron, as for all other established branches of manufacture, and should Congress take prompt and favorable action upon the free banking act, which will undonbtedly be brought before it as soon as the winter session has fairly begun, we shall probably have a most prosperous year—provided, of course, there is no tinkering with the tariff to satisfy the clamors of the small, but noisy, constituency of free traders and revenue reformers, who are not without representation in Congress. So far as the tariff is concerned, the *laissez faire* policy is the only one which can be followed without entailing greater evils upon the industries of the country than could possibly result from financial panic.

The most serious phase of the difficulties through which we are now passing is found in the effects of the general reduction of manufacturing upon the working classes. It is a very serious thing for those depending upon wages for the support of their families, to be thrown even temporarily out of employment at the beginning of winter ; but from their large earnings during the past two years, the thrifty and prudent have been able to lay aside sufficient to provide for such an emergency as this, while those who have failed to make such provision will suffer the natural and proper consequences of their improvidence. It is not probable that manufacturing operations will be suspended long enough to cause any great suffering among the working classes, but those who are unprepared will be compelled to deny themselves many of the comforts and luxuries which they have enjoyed in times of greater prosperity, and which have become almost necessities. The promptness with which manufacturers have cut down wages, and the disposition manifested to force the workingmen to relinquish the advantages they have gained through the agency of their trade unions, cannot be wondered at under the circumstances, much as we may deprecate the feeling of suspicion and jealousy between labor and capital of which it gives evidence. The trade unions have striven to promote that feeling by every means in their power, and, having taken every advantage of employers when labor was in demand, they have no reason to complain if employers take advantage of them at the present time to withdraw every concession made the unions, and force wages down to the lowest rates. Of course, the value of labor will sooner or later determine itself, and wages will be regulated by the competition between capital seeking labor and labor seeking employment ; but in the meantime the unions are powerless, and it will be a long while before they are again in a position to attempt to control employers or dictate how their business shall be managed. We are sorry for those who will suffer, but if the power of the trade unions for mischief is weakened, and their inability to protect the interests of labor when protection is needed, demonstrated to the simple understandings of the workingmen who have hitherto followed blindly the lead of demagogues and unprincipled agitators, the country will have gained far more than it loses from the partial suspension of manufacturing.

The Treasury Department has decided that so-called slab iron, of sizes ranging from 19¾x14½x¼ inches to 35x10x⅛ inches, intended for use in the manufacture of safes, is held to be dutiable as follows : The portion which is three-sixteenths of an inch or over in thickness, under the provision in the third section of the act of June 30th, 1864, for "boiler and other plate iron not less than three-sixteenths of an inch in thickness" at one and a half cents per pound, and the remainder, which is less than three-sixteenths of an inch in thickness, under the provision in the same section for "sheet iron, common or black, not thinner than No. 20 wire gauge," at one and a quarter cents per pound, both less ten per centum under section two, act of June 6th, 1872.

The president of the British Association, during the course of some remarks delivered at the recent meeting at Bradford, gave the British manufacturers some good advice, which they would do well to heed: "Any manufacturer of the present day," said he, "who does not make efficient arrangements for gradually perfecting and improving his processes, ought to make at once enough money to retire; for so many are moving onward, in this and other countries, that he will soon be left behind." Considering how far the British manufacturers are behind those of the United States in the adoption of labor-saving machinery and processes, it is doubtful whether they will be able to keep up with the progress of the times, even if they are suddenly inspired with a desire to do so. At present they manifest but little disposition to depart from the ways of their fathers and grandfathers, owing doubtless to their inherent respect for that which is ancient and venerable; but the inroads we are now making upon markets which they have hitherto monopolized, the development of our manufacturing industries, and the loss of our custom for many staple products will, perhaps, have the effect of convincing them that unless they economize labor to the utmost extent, they have but little chance of keeping up with the progress of the century.

The Treasury Department has received from England a statement of the comparative exports of British manufactures to the United States during the eight months ended with August, 1872 and 1873, from which we take the following items :

	1873.	1872.
Pig, tons	78,403	153,331
Bar, bolt and rod, tons	21,574	49,316
Railroad, tons	141,330	340,321
Sheet, hoop, etc., tons	14,296	22,620
Cast or wrought, tons	11,806	9,068
Steel, unwrought, tons	13,966	16,198
Tin Plates, tons	64,353	63,739
Tin, unwrought, cwts	18,489	14,160
Lead, pig, pipe and sheet, tons	2,324	5,757
Hardware and Cutlery	£548,925	£651,222

We invite for these figures the attention of those who have persistently and illogically denied that the result of a protective policy was to diminish the volume of our imports, without depriving the people of the blessing of "abundance." We have had enough of all the articles named—more than enough of some of them—at prices as low as, and in some instances lower than, they would have been had we followed the teachings of the revenue reformers, and yet we have managed to reduce our imports largely, and, while so doing, have built up our own industries and give profitable employment to a great army of mechanics, who would otherwise have been compelled to work as agricultural laborers for low wages, and under conditions which would soon have reduced them to the status of the agricultural laborers of Great Britain.

Scientific and Technical Notes.

Messrs. Merryweather & Sons, fire engine builders, of London, publish a letter in an English journal, calling attention to the process of

LEAD BURNING,

which they claim to be greatly superior to jointing lead by means of "plumbers' solder." They urge its adoption on the grounds that it is far cheaper to have a pure lead joint rather than a solder joint, because it lasts longer and costs only one-sixth that of the latter, and as an instance of cost we give the following from actual experiment at Messrs. Merryweather's works.

By lead burning process :

	s.	d.
One man and one boy will joint 90 ft. of lead on a roof in one day, say, wages	9	0
Strip lead, including waste, 30 lb.	7	0
Use of machine	1	0
	17	0

By soldering process :

	£	s.	d.
Two men will joint 90 ft. of lead on a roof in three days, say, wages	1	16	0
Solder, 67 lb, at 1/	3	7	0
Firing (on the roof) three days, for heating irons, melting solder, lamp black, etc., 1/6.	0	4	6
	5	7	6

The machine is a simple contrivance, consisting of a wooden vessel fitted with acid and zinc chambers ; there is also a circular bellows; pipes are connected with each and terminate with a three way piece, to which the burner is affixed. Its cost is about £30. Messrs. Merryweather, also, do not omit to state that by adopting the lead burning process, buildings are proof against that which we so repeatedly see stated in fire brigade reports, "Cause of fire, plumbers on the roof." Canterbury Cathedral and Alexander Palace would probably have remained intact but for this source of danger.

A British exchange publishes the following, relating to

COAL AND IRON ORES IN NEW ZEALAND :

A novelty in the iron trade is the purchase, just announced, by a company of Staffordshire ironmasters, of a tract of coal and ironstone country in New Zealand nearly 20 square miles in extent. The property in question is of great mineral value, being estimated to include nearly 9000 acres of coal and ironstone. The chief seam of coal is found in some parts within a few yards of the surface as thick as 20 feet ; and it is computed to be capable of yielding an average thickness of 10 feet throughout the whole 8700 acres. This represents no less than 126,000,000 of good coal. The ironstone is of the brown hematite class, and contains as high a percentage as 62 of fine iron, and is believed to yield an average of 50 per cent. Four specimens reported on Thursday, after analysis by a metallurgical chemist in the Midlands, showed 60, 59, 50½, and 36 per cent. respectively. Calcined, it will be worth in this country 30/ per ton. It can be brought across from the Frith of Thames at about 5/6 per ton, and if, by-and-by, it should have to be sold at much less per ton than the prices now current, quite half-a-guinea per ton profit may be looked for. Made into iron upon the estate, the coal and ironstone estimated each at 8/ per ton, and the limestone, also found on the estate, at 7/, would enable a ton of hot blast pig to be produced at £2. 13/ per ton, and the quality would be equal to British iron, which is now selling at £7. Made into cold blast iron the cost would be about £2. 17/6, and the quality would be equal to the British iron which now realizes £8 per ton.

An abstract of the report of the Army Ordnance Bureau, which reaches us from Washington, presents some interesting facts relative to the

UNITED STATES ARMY ORDNANCE,

as well as certain items showing what it costs to arm our forces in time of peace. The report shows that the amount of the appropriation for the year ending last June was $2,306,935, and the expenditures $2,161,517. The bureau is now making the Springfield rifle (adopted by the board appointed to select the best small arm), and to pay for them asks an appropriation of $500,000. This will supply 35,000 of such rifles. It is not presumable that the new arm selected will soon be superceded. There is a standing appropriation of $200,000 annually for arming and equipping the militia. The bureau recommends that the appropriation be increased to $500,000 for the next year. The law appropriating the former amount was passed in 1808. At that time our population was comparatively small, and the price of arms low ; but now, with a population of 40,000,000, the increase asked is considered not unreasonable. Progress has been made in manufacture of heavy rifle ordnance from the appropriation of last year. The bureau ask for the ensuing year an appropriation of $1,500,000 for the armament of fortifications. The position is taken that the armament of fortifications costs as much as the forts themselves ; hence the necessity of adequate appropriations for that purpose, for without armament the forts are useless. One million four hundred thousand dollars are needed to this end. An appropriation of $75,000 is asked for cast iron guns for experimental purposes. Supplies of powder are now kept in forts. The powder should be removed, especially when adjacent to cities ; and, therefore, with a view to safety, the bureau recommends that a general powder depot be established distant from population and in the mountains. The board is making preparations to try breech-loading cannon, including the Moffit gun, a test of which was ordered by Congress. Experiments will also be made with the Krupp gun, which was presented to the government by North Germany. Congress has made an appropriation for the purchase of Gatling guns, for use in the mountains with cavalry. A board is engaged in trying them with reference to coast defence. The bureau wants a general arsenal on the Atlantic coast, and proposes to dispense with some of the smaller establishments. It also wants, in this connection, a ground for experiments in gunnery as in England and other parts of Europe. We now have only Fortress Monroe for that purpose, which in some, respects, is inaccessible, and too far distant from the North and West. The bureau is represented to be in a satisfactory condition, and to lead the world in its improvements in gunnery. Appended to this report is an interesting report of Gen. Terry's Board on the adoption of a breech-loading rifle for the military service. The report is fully illustrated by photographs of all the arms presented for examination, and is undoubtedly the most complete and exhaustive report on the subject that has ever been made. It is believed that the Springfield arm adopted is the best in the world.

A trial recently took place on the Thames of

A FLOATING FIRE ENGINE,

which is thus described by *Engineering* : The engine and pump have been placed in one of the ferry boats used for the purpose of carrying passengers across the river ; and the chief reasons for adopting this arrangement are that it saves the large expense of building an independent vessel to contain the engine. The whole cost of fitting in the engine pump and piping amounts to only about £350, whereas the large floating engines on the Thames, including, of course, their hulls, have cost about £8000. The pumps and engine are similar to those now being made by Messrs. Shand, Mason & Co., for their land engines, such as those exhibited at the Vienna Exhibition. The engine is horizontal, with a single cylinder, and it has no fly-wheel, although the crank is retained. An improved valve arrangement provides for a continuous rotary motion of the crank shaft. The crank is assisted past the dead centers by a piston fitted on the slide rod, that rod performing alternately the duties of a slide rod and a connecting rod. There was a peculiarity to be dealt with in the present instance, arising from the circumstance that, whereas the land engines are worked with a pressure of from 100 lbs. to 150 lbs. on the square inch, the ferry engines work with only between 40 lbs. and 50 lbs. To make this clearly understood, it should be stated that the same boiler that supplies steam to the engine of the ferry boat, will be used in the case of a fire to work the engine of the pump, the steam being turned off from the ferry boat engine on arriving at the scene of the fire and thrown on to the fire engine. That the same power of throwing the water might be produced with the 50 lbs. of steam supplied by the boat engine as is usually had from the greater pressure in the boilers of the land engines, the area of the steam cylinder has been enlarged in order that power may be got up to meet the diminished pressure in the boiler. At the trial which took place on the Clyde on Monday afternoon, this arrangement was shown to be quite successful, as with only 48 lbs. of steam a water pressure of 120 lbs. was obtained.

In a paper on the subject of the

ECONOMICAL GENERATION OF STEAM,

by Mr. Robert Sutcliffe, we find the following : The different objects sought to be attained in a steam boiler are somewhat incompatible. As capacity is increased in order to provide reservoir room for steam, the ability of the boiler to resist pressure is diminished ; to enable it to resist pressure the plates must be made thicker, and this extra thickness impedes the conduction of heat ; and if the size of the boiler be diminished with a view to its resisting increased pressure, its value as a reservoir of force is diminished ; therefore the boiler ought to be treated as a compound machine having these several objects in view, and with adjuncts, so that each of them may be fulfilled as far as possible. The ordinary double flued boiler, about 7 feet in diameter, and well filled with Galloway tubes, is, then, recommended for the generation of steam, the resistance of pressure, and also as supplying a reservoir of force in steam power, but that this boiler is insufficient in itself, and ought to be supplemented by an efficient economizer to utilize the waste heat

from the boiler. Steam tubing is recommended for this purpose, the metal not being so liable to fracture as cast iron, and being capable of resisting a great steam pressure. If the waste heat impinges upon pipes filled with feed water at a low temperature the chilling process at once commences, and the heat is intercepted and abstracted, and the chimney draught, which is produced by hot air, is injured or destroyed, and the extent to which the draught is thus impaired is, in many cases, the measure of the efficiency of the economizer; and to remedy this, it is recomended that the fan blast be adopted to lift the draught and promote combustion. Machine firing is recommended as the most effective mode, because it supplies the fuel continuously, insures intense ignition, prevents the chilling results of cold air rushing in, effecting an economy in fuel, labor and wages, and facilitating the prevention of smoke; and to this end it is recommended that a glass mirror be affixed in some convenient place so that the fireman may at any time see how the chimney top is behaving. If the boiler be furiously fired without any regard to economy in fuel, more steam can be raised and more work got out of the boiler, though it may be at too great a cost. If, however, fuel be economized to the utmost, less work is got out of the boiler, so that whilst we seek to secure one object we must of necessity partially sacrifice the other.

According to M. Boussingauet, the

DISTRIBUTION OF IRON IN THE SUBSTANCES OF THE BLOOD

is as follows: In dry fibrine the proportion of mineral matter is 2·1511 per cent.; the percentage of iron being 0·0466 per cent. In the dried blood gloubles, mineral matter 1·325 per cent.; iron, 0·35 per cent. In the serum, mineral matter 0·828 per cent.; iron, 0·0082 per cent. The composition of blood is as follows:

	Human. per ct.	Iron. per ct.	Bullocks. per ct.	Iron. per ct.
Fibrine	0·3	0·00014	0·4	0·00019
Albumen	7·0	0·00604	7·4	0·00639
Gloubles	12·7	0·04445	10·5	0·03675
Mineral matter	1·0		1·0	
Water	76·0		80·1	
	100·0	0·05068	100·0	0·0433

There has lately been brought out in England another new

PROCESS FOR THE MANUFACTURE OF IRON DIRECT FROM THE ORE,

which is thus described by a correspondent: Among the exhibitors on 'Change in Wolverhampton, on Wednesday, was Mr. Gerhard, the inventer of the process of making iron direct from the ore, who, with Mr. Chaddick, has works at Bradley, and whose system has been commended, on behalf of the ironworkers, by Mr. Capper, the union agent. Mr. Gerhard showed small samples of splendid cast iron which attracted great attention. Mr. Gerhard advocates his system in the manner following: Mr. Bell has recently stated before the Committee on Coal, in the House of Commons, that he estimates that 5¼ tons of coal are required to produce a single ton of bar iron, but Mr. Bennet Aitkens puts the amount at 6 tons 7 cwt. Suppose out of, say, 6 tons, 2 tons are required to produce a ton of cast iron, the remaining 4 tons are required to produce a ton of bar iron. The protoxide of iron, containing 77·78 per cent., requires 21·43 of carbon. The magnetic oxide, containing 72·41 per cent., requires 28·56 carbon, and the sesquioxide, containing 70 per cent., requires 32·17 carbon. Admitting that the three descriptions of iron ores were employed in the making of cast iron, the 30 lb. of carbon would be sufficient to produce 100 lb. of cast iron, or a ton of iron weighing 2400 lb. would require 720 lb. of carbon, a saving of 3760 lb. of carbon in the production of one ton of cast iron, which can be realized by using the "iron coke." The next thing to be considered is the converting of cast iron into wrought iron. It can be compared to ascending and descending an isosceles triangle instead of walking on the base. It is evident that when heavy pieces of solid pig iron are placed in a puddling furnace to be melted, the greater portion of the heat must be wasted, and after it is liquified a much longer time is required to eliminate the carbon which it contains, and other extraneous elements of which it is composed, with a continuation of an immense waste of fuel. The "iron coke" already named may be produced from any description of substances containing iron mixed with the necessary fluxes and its equivalent of carbon; consequently, when thrown into a heated furnace, the carbon which it contains immediately acts on the oxygen contained in the ore. Even the Barrow hematite, which is considered one of the most refractory in this country, is easily reduced to a pasty state, fit for balling in a short time, with an immense saving in fuel and labor.

The Secretary of the Ironworker's Association of the Wolverhampton district, who has been inspecting Mr. Gerhard's process, says of it:

SIR—It being the fashion amongst a certain class of people to say that the ironworkers are opposed to improvements in the manufacture of iron which are likely to decrease the amount of labor required, allow me to say that I was invited by Messrs. Gerhard & Co., of Bradley, to witness their process of making wrought iron from a compound which they termed iron coke. I did so on the 19th ult., and the least I can say is that I was much pleased with it. I have to-day reported to the Ironworkers' Council what I saw of it, what I did during the day in connection with it, and what I now think about it. During my thirty-five years experience in the ironworks in England and America—thirty years of which I have worked as a puddler—I never saw a heat got ready, or brought to the proper state when ready for drawing, with so little labor before—the time in getting out a heat not exceeding half an hour. I am persuaded that the puddlers, instead of opposing it, would be pleased with its general introduction. This process dispenses with the melting and boiling—there is nothing to be done but the balling. The time cannot be far distant when this method of making wrought iron must supercede the present laborious and costly mode of making it from pig iron. Samples of cast iron made by their process were shown to me, at the same time, which, as far as I was enabled to judge by inspection, appeared to be very superior to the cast iron generally used in our forges for the production of wrought iron. For myself, I am not opposed, but ready to support, and I advise the ironworkers to support, any change, either chemical or mechanical, that is calculated to cheapen production on the one hand and lessen the amount of labor on the other. That Messrs. Gerhard & Co.'s process is competent to secure both those ends there appears to be but little room for doubt. Yours, etc., JAMES CAPPER.

The following, which we take from the *Engineer*, relating to

THE DANKS FURNACE IN ENGLAND,

will be read with interest:

Information has reached us concerning the operations of Danks furnaces at the Carlton Industrial Company's Works, and at the Erimus Works, where they have been most recently applied, which promises little short of a revolution in respect as well of the cost of the making of finished iron as in regard to the labor question. Experience seems to confirm the statement made early in the history of the invention, to the effect that twelve Danks furnaces, with their accompanying machinery, will produce as much iron as fifty ordinary puddling furnaces; and that the outlay in laying down the machinery is about equal in both cases. Contrary to the expectations of those who are averse to the new method, the iron appears to be well manipulated throughout, and possesses fibre that from the same pig iron it would be impossible to secure by the use of the old hand furnace. This statement, however, must be taken with reserve. At the works we have mentioned there is now being produced, with Cleveland iron alone, puddled bars of a quality pronounced to be equal to those made by the old furnace from Staffordshire all mine pigs. We understand that there is a saving in favor of the new method of at least 30/ per ton to start with. Then the yield is much larger. The expensive fettling now employed in the old plan, with hardly any other beneficial effect than the saving of the furnace from being burned, is in the Danks furnace incorporated with the iron and adds to the yield. Taking ton per ton of puddled bars made under the two methods, the Danks furnace produces from the same quantity of pig iron and the same quantity of fettling about 2½ cwt. more than is produced by the use of the hand furnace. Thus we get perhaps another 20/ in favor of the Danks furnace. Fuel costs no more on the new than on the old system; and the labor is obtained at about half the money. From all causes together there is reason to conclude that finished iron can be made by the machine furnace at between £4 to £5 per ton less money, quality for quality, than by the hand process. Mr. Robert Death, the leading ironmaster in North Staffordshire, is proceeding with the laying down of ten Danks furnaces which he has ordered; and this will be the first which it seems likely will be put into operation in South Staffordshire. So soon as the Danks furnace becomes more widely adopted it seems clear that the advantages of those who employ it will be very considerable over the concerns who use only the hand furnace, and if this be confirmed by further experience, it must certainly lead to a reduction in the price of iron, and, consequently, to the developing of the iron industry, and to the ability of the British ironmaster to hold his own in competition with the progressive American, some of whose present advantages are in no little respect due to the use of Danks furnaces in certain of the works there. The furnaces are kept on without intermission day and night, and it is not customary to stop the work at midday on Saturday; they cease for Sunday on the evening of Saturday. The Carlton Industrial Company began to apply the Danks furnaces with the assistance of puddlers who had learned their trade at the old hand furnaces, and who were members of the ironworkers' Union. In accordance with the rules of the association, which regulates the proceedings of the men at the works generally in the North of England, these old hands declined to charge the Danks furnace after one o'clock on Saturdays. Messrs. Briggs, therefore, dispensed with their services, and the furnaces are now being worked by men who have had very little previous knowledge of the working of iron. The Erimus Works started with altogether new hands. To work two furnaces there are required a forehand, an underhand, and a laborer. The forehand is usually selected because of some little knowledge he possesses of machinery and iron-works, and the underhand and the laborer are ordinarily men who have little acquaintance with either. Indeed, talking of the workmen as the old workmen would talk of them, the men who are working these Danks furnaces are laborers; yet these men work the machinery attached to the furnaces, as well as attend to the furnaces themselves. They are all engaged for a term of twelve months certain. The wages of the most responsible are, during the first three months, 7/ per day; in the next three months, 8/; and throughout the last six months, 10/, which is the maximum remuneration per day. This remuneration is not amiss for such labor with so little skill as is found necessary. Ironmasters who are smarting under the high wages which are now being paid to the old hand puddler, are gathering courage as to the future.

The St. Louis Bridge.—The Commission of United States Engineers, appointed to examine the steel bridge now in course of construction at St. Louis, and ascertain whether it will, when completed, be an obstruction to navigation, has made an elaborate report. The conclusion arrived at is that the bridge will prove a serious obstruction to the navigation of the river. As it is now impracticable to change the plans of the bridge, or to raise it, except at enormous expense, the commission recommend that a canal or open cut be made behind the eastern abutment, this canal to be 125 feet wide, extending from a point 500 feet above the bridge to 300 feet below it. The canal to be crossed by a draw having a clear opening the whole width of the canal. It is also recommended that arch trueses, like those of this bridge, be in future prohibited for bridges over navigable streams. Of the progress of the work the *St. Louis Democrat* says: During the past week 79 tubes were put in position, making 612 in all which are in place. As the whole number to be contained in the structure is 1012, only 400 are now remaining. Yesterday the two outer ribs of the first span were completed, with the exception of placing the connecting tube in each of the four strands. They are ready to be put in, and the couplings are fitted and lying on the bridge beneath. Early to-morrow morning they will be put in place and keyed up, and the first span will be an accomplished fact. As soon as that is done there will be no further use for the heavy wooden scaffolding now encumbering the span, and it will be removed as speedily as possible, thus affording a view of the finished structure in its graceful outlines and proportions. On the west side of the east pier six lengths of tubes have been placed, and the same on the east side. On the east abutment the arch has been built out seven lengths, or a distance of 84 feet. It looks now as if the promise of the contractors to have the spans entirely completed by the 1st of January will be carried out and a little time to spare.

The tunnel, which forms a part of the western approach, is making rapid progress. The excavations are nearly completed, and the arching proceeds at the rate of nearly 400 feet per week.

CORRESPONDENCE.

Welding Iron and Steel.

OFFICE OF PENNSYLVANIA COMBINED IRON AND STEEL ASSOCIATION, 220 WALNUT STREET, PHILA., October 22, 1873.

To the Editor of The Iron Age: There has of late been considerable discussion upon the subject of iron and steel, and we think, according to the best information that can be obtained, no one ever had better opportunity for testing the relative properties of steel and iron than Sir William Armstrong, with the kingdom of Great Britain to back him.

Sir William says: "It is impossible that I can hold any other opinion than that the vibratory action attending accessive concussion is more dangerous to steel than to iron," and we think that years of experience in the manipulation of iron and steel fully attests the correctness of his opinion.

What we desire to impress upon the public mind is the importance of the *two metals combined* for such purposes, and in such proportions, as are best adapted for the uses they may be intended for; and, further, to give a few facts in the working of steel by our process which we think of great utility, and which, so far as we know, has never been accomplished by any other process.

We contend that steel cannot be made to answer the purposes of steel and iron at one and the same time; that is, in fact it must be either steel or iron; hence, high grades and low grades of steel, as they are termed, and the lower grades but little, if any, better than the best grades of iron.

It has been said that no one could tell where iron leaves off and steel begins, but we think steel commences where iron presents carbon, and steel is no longer steel when it has lost its carbon, for it is carbon that makes steel.

At a recent convention of the American Railway Master Mechanics' Association, held at Baltimore, it was contended that steel axles did not wear as long as iron. The reason is obvious. No engineer would think of using a car axle made of *steel proper*—that is, of steel high in carbon, which would give the necessary wearing property, but must have steel that will stand the axle test of iron; consequently, it is but iron, or a very low grade of steel, which, for wearing purposes, is no better than iron.

A similar difficulty arises in the manufacture of railroad rails. Steel that is best adapted to wearing purposes is liable to sudden fracture, and would not be considered safe "under accessive concussive strain," quoting a well known author; therefore, the Bessemer steel rail has but the slightest amount of carbon, or barely enough to distinguish it from iron.

We claim that we have a process that will make safe and reliable high grades of steel under any and all circumstances, giving longer life to rails and axles, and safe and reliable as the best iron, by combining iron and steel together.

It is a well known fact that ingot steel is more or less open, porous or spongy, and that no amount of blooming or hammering unites or welds the particles, from the fact that a welding heat cannot be taken upon the ingot after leaving the mold. By our process we can safely bring an ingot to a welding heat, and finish it into a bar at the same heat, without in the least detracting from the quality of steel.

Yours, respectfully,
ELDRIDGE WHEELER, Vice Pres't.

The Ordnance Report on Rifles and Heavy Ordnance.—General Dyer, Chief of Ordnance, in addition to portions of the report already published in these columns, says: On the subject of small arms, in conformity with the provisions of the Act of June 6, 1872, appropriating $150,000 for the manufacture of arms at the national armory, a board convened in New York city September 3, 1872, and concluded its labors May 5, 1873. After an exhaustive examination and trial during a session of months' duration, of over 100 arms, including those adopted by the first military powers of Europe, the board resolved that the board recommend that the Springfield breech loading system be adopted for the military service of the United States, in accordance with the provisions of the Act of Congress approved June 6, 1872. The Springfield arsenal is now engaged in the manufacture of rifles and carbines on the new model for the military service. Ten thousand of these arms will be supplied to the army for trial. The report says respecting heavy ordnance: The importance of the subject increases with the earnest and continued efforts on the part of all nations, not only to improve the quality of the guns, but in providing in quantities those that have given best results in experimental trials. It is not the part of wisdom to wait for ultimate perfection in gun constructions, which may never be attained, or for the first rumbling of approaching strife, when guns are needed in fortresses and not in foundries to commence the tedious and costly work of construction. In the modern quick and decisive settlement of differences by the arbitrament of arms there is no time for preparation after the declaration of war, and a nation may sink beneath the powerful blows of a well armed adversary in less time than it takes to manufacture a single gun.

Our Foreign Trade.

Statistics of Our Imports and Exports for the Fiscal Years Ended June 30, 1872, and 1873.

The forthcoming monthly report, No. 12, of the Bureau of Statistics, will make the following showing of our imports and exports for the fiscal years 1872 and 1873:

IMPORTS OF FREE ARTICLES.

Articles.	1873.	1872.
Barks	$1,760,396	$1,283,352
Chemicals, drugs, dyes, and medicines	4,789,619	2,307,298
Chloride of lime, or bleaching powder	1,102,360	....
Coffee	44,101,540	....
Gold and silver coin and bullion	21,480,937	13,743,679
Gums	1,733,665	1,728,634
Hair, unmanufactured	1,310,057	1,467,051
Hides and skins, other than furs	16,948,421	2,996,924
India rubber and gutta percha, crude	6,900,550	4,789,590
Paper materials	5,727,045	6,007,733
Silk, raw	6,460,621	5,625,630
Tea	24,466,094	....

IMPORTS OF DUTIABLE ARTICLES.

Articles.	1873.	1872.
Animals living	$3,227,953	3,465,554
Barley	2,962,981	3,403,607
Rice	2,304,661	2,317,172
Wheat	2,052,994	2,188,689
Buttons and button materials	2,838,275	2,243,653
Chemicals, drugs, medicines, and dyes	6,985,764	7,471,188
Coal, bituminous	1,589,663	1,391,206
Copper, and manufactures of	3,745,046	1,926,558
Cotton, and manufactures of	35,301,317	25,307,447
Earthen, stone, and China ware	6,015,906	5,270,785
Fancy goods	4,861,199	5,139,785
Fish	2,895,945	1,907,698
Flax, and manufactures of	21,566,052	22,630,243
Fruits	9,699,198	10,383,466
Fur skins, dressed	2,910,500	2,722,330
Glass and glassware	7,320,044	5,834,712
Hemp, raw	3,347,973	4,580,049
Hides and skins, other than furs	1,150,191	12,973,904
Iron and steel, and manufactures of	59,308,418	55,540,188
Jute and other grasses, and manufactures of	4,443,942	4,488,890
Lead, in pigs, bars, and old	3,222,627	3,369,075
Leather and leather goods	11,378,776	13,208,837
Opium, and extract of	1,978,502	2,107,341
Paper, and manufactures of	2,354,799	2,206,839
Precious stones	2,870,690	3,053,595
Seeds	4,194,914	4,894,794
Silk, manufactures of	29,989,869	30,448,618
Soda, and salts of	6,683,936	4,964,528
Sugar, brown	77,952,499	79,129,059
Sugar, refined	9,901,045	10,627,511
Molasses	4,722,165	2,066,027
Tin, in bars, blocks or pigs	363,393	3,419,042
Tin, in plates	14,995,650	12,312,428
Tobacco, leaf	6,416,693	4,726,143
Watches, &c	3,274,825	3,448,983
Wines, spirits, and cordials	9,354,221	8,582,223
Wood, and manufactures of	11,788,999	9,647,259
Wool, hair of alpaca, &c	71,589,398	79,614,544

DOMESTIC EXPORTS.

Articles.	1873.	1872.
Agricultural implements	$2,585,914	$1,547,413
Animals, living	2,033,447	1,773,716
Indian corn	23,794,694	23,984,365
Indian-corn meal	1,474,827	1,314,999
Wheat	51,452,254	38,915,060
Wheat flour	19,331,664	17,955,684
Coal	2,914,055	1,961,656
Cotton, and manufactures of	230,190,597	182,988,925
Drugs, chemicals and medicines	2,358,730	1,783,680
Furs and fur skins	3,725,550	3,313,005
Gold and silver, and manufactures of	74,016,400	72,891,479
Hides and skins, other than fur	3,605,023	1,445,178
Iron, and manufactures of	11,119,831	8,747,106
Leather and leather goods	5,305,494	3,684,089
Oils	47,942,691	40,686,107
Bacon and hams	35,022,137	21,126,592
Cheese	10,496,010	7,752,918
Lard	21,345,815	20,177,619
Pork	5,007,035	4,122,308
Tallow	7,068,471	6,973,189
Tobacco, leaf	22,689,135	24,186,166
Snuff	2,627,585	2,511,866
Wood, and manufactures of	19,119,893	15,940,872

FOREIGN EXPORTS.

Articles.	1873.	1872.
Gold and silver coin and bullion	$10,233,556	$5,744,003
Sugar and molasses	1,516,216	863,316
Wool	1,543,671	355,993

The principal articles remaining in warehouse June 30, 1873 and 1872, respectively, were as follows:

Articles.	1873.	1872.
Breadstuffs and other farinaceous food	$1,458,323	$1,366,925
Coffee	96,749	16,997,875
Cotton, and manufactures of	3,470,997	4,507,707
Flax, and manufactures of	2,026,859	2,256,051
Fruits	1,059,701	1,604,779
Hemp, and manufactures of	1,749,112	2,269,072
Iron and steel, and manufactures of	7,018,108	4,859,890
Leather and leather goods	1,298,261	1,997,113
Silk, manufactures of	2,589,565	2,985,533
Spices	1,116,017	1,649,543
Sugar, brown	24,678,211	25,973,234
Molasses	1,470,792	2 149,148
Tea	486,065	18,510,942
Tobacco, leaf	3,012,960	1,747,052
Wines, spirits and cordials	2,913,085	2,372,039
Wool, &c., and manufactures of	12,316,408	15,493,620

Important Discovery of Anthracite in the West Reported.—The following letter requires no explanation:

LEAVENWORTH, KAN., Oct. 18, 1873.

Messrs. Kelley, Morley & Co.: GENTLEMEN—Thinking it to be a matter of interest to yourselves, and, perhaps, to the Chicago Exposition, we have sent you by express to-day a specimen of anthracite coal from a vein discovered this season by Professor F. Haven, geologist of the reconnoissance under the direction of Lieutenant E. H. Ruffner, Chief Engineer of the Military Department of Missouri.

The existence of anthracite coal in this country west of the Alleghanies has been so long doubted, and its discovery so unlooked for, that these specimens will doubtless be looked upon with distrust, even by scientific men; but the evidence which comes to us is of such a character as to leave no question as to the genuineness of the discovery. The locality is about 260 miles southwest of Denver, Col., and will soon be within access by rail. The vein is 4½ feet thick, uniform in quality, and evidently of great extent. We consider it a matter of more than local importance, and would suggest that it be placed on exhibition in the Exposition now going on in your city. Specimens have also been forwarded to the department at Washington. Yours, truly,

GREAT WESTERN MANUFACTURING CO.,
D. F. FAIRCHILD, Secretary.

Fuel Economy in Smelting Operations.

In the lecture on "Fuel," lately delivered by Dr. C. W. Siemens, at Bradford, we find the following:

We have now come to the third branch of consumption, the smelting or metallurgical furnace, which consumes about 40,000,000 of the 120,000,000 of the fuel produced. Here also is great room for improvement, the actual fuel consumed in heating a ton of iron up to the welding point, or of melting a ton of steel, is more in excess of the theoretical quantity required for these purposes than is the case with regard to the production of steam-power and to domestic consumption. Taking the specific heat of iron at ·114, and welding heat at 2700° Fahr., it would require 2700 × ·114=307 heat units to heat 1 lb. of iron—1 lb. of pure carbon developes 14,500 heat units, 1 lb. of common coal 12,000, and, therefore, 1 ton of coal should bring 39 tons of iron up to the welding point. In an ordinary reheating furnace 1 ton of coal heats only 1⅗ ton of iron, and therefore produces only 1-23d part of the maximum theoretical effect. In melting one ton of steel in pots 2⅖ tons of coke are consumed, and taking the melting point of steel at 3600° Fahr., the specific heat at ·119, it takes ·119, multiplied by 3600=428 heat units to melt 1 lb. of steel, and taking the heat-producing power of common coke also at 12,000 units, 1 ton of coke ought to be able to melt 28 tons of steel. The Sheffield pot steel melting-furnace, therefore, only utilize 1-70th part of the theoretical heat developed in the combustion. Here, therefore, is a very wide margin for improvement, to which I have specially devoted my attention for many years, and not without the attainment of useful results. I have, since the year 1846, or very shortly after the first announcement of the dynamical theory, devoted my attention to a realization of some of the economic results which that theory rendered feasible. I fixed upon the regenerator as the appliance which, without being capable of reproducing heat when once really consumed, is extremely useful for temporarily storing such heat as cannot be immediately utilized, in order to impart it to the fluid or other substance which is employed in continuation of the operation of heating or of generating force. Without troubling you with an account of the gradual progress of these improvements, I will describe to you shortly the furnace which I now employ for melting steel. This consists of a furnace-bed made of very refractory material, such as pure silica, sand and silica, or Dina's brick, under which four regenerators, or chambers filled with checkerwork of brick, are arranged in such a manner that a current of combustible gas passes upward through one of these regenerators, while a current of air passes upward through the adjoining regenerator, in order to meet in combustion at the entrance into the furnace chamber. The products of combustion, instead of passing directly to the chimney, as in an ordinary furnace, are directed downward through the two other regenerators on their way toward the chimney, where they part with their heat to the checkerwork in such a manner that the highest degree of heat is imparted to the upper layers, and that the gaseous products reach the chimney comparatively cool (about 300° Fahr.) After going on in this way for half-an-hour, the currents are reversed by means of suitable reversing valves, and the cold air and combustible gas now enter the furnace chamber, after having taken up heat from the regenerator in the reverse order in which it was deposited, reaching the furnace, therefore, nearly at the temperature at which the gases of combustion left the same. A great reversion of temperature within the chamber is the result, and the two first-mentioned regenerators are heated to higher degree than the latter. It is easy to conceive that in that way heat may be accumulated within the chamber to an apparently unlimited extent, and with a minimum of chimney draught. Practically the limit is reached at the point where the materials composing the chamber begin to melt. Whereas a theoretical limit also exists in the fact that combustion ceases at a point which has been laid by St. Clair Deville at 5000° Fahr., and which has been called by him the point of dissociation. At this point hydrogen might be mixed with oxygen, and yet the two would not combine, showing that combustion really only takes place between the units of temperature of about 500°, and 4500° Fahr. To return to the regenerative gas furnace. It is evident that there must be economy where, within ordinary limits, any degree of heat can be obtained, while the products of combustion pass in the chimney only 300° hot. Practically, 1 ton of steel is melted in this furnace with 12 cwts. of small coal consumed in the gas-producer, which latter may be placed at any reasonable distance from the furnace, and consists of a brick chamber containing several tons of fuel in a state of slow disintegration. In large works a considerable number of these gas-producers are connected by tubes or flues with a number of furnaces. Collateral advantages in this system of heating, which is now extensively used in this and other countries, are that no smoke is produced, and that the works are not encumbered with solid fuel and ashes.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Oct. 29, 1873.

The past week, though without events of great importance or startling interest, has been characterized by a feverish and unsettled feeling; although there are evidences on all sides of a return of confidence, and a general feeling that the danger of wide-spread commercial disaster is past. There is, as yet, no noticeable improvement in business, but the fact that the mercantile community have been so far able to meet their liabilities as to avert anything approaching a credit panic, may itself be considered a most favorable indication. The partial suspension of manufacturing throughout the country, which we have discussed in our editorial columns, may seem to warrant the belief that the country is in a worse condition than it really is. We may state, however, that most manufacturers with whom we have conversed are of the opinion that they will improve their prospects for next year by limiting their production this season, and that the expectation of an active and profitable spring trade is generally entertained.

In the condition of the New York banks a marked improvement is reported, and their gain in legal tenders has been great enough to warrant the adoption of a resolution calling in the outstanding clearing house certificates on the 1st of November. Greenbacks are no longer at a premium over certified checks, and the banks are able to meet all demands upon them. The stringency throughout the country is the effect of the panic, and as the influence of such an event in this market extends in gradually widening circles, like those which spread over the surface of water when suddenly disturbed, it will be as long before the improvement is felt in country districts as it was before the stringency here forced a suspension of the ordinary industrial and commercial activities. The local money market has been somewhat irregular during the week, with rates on call ranging from 5 per cent, per annum to 1-16 of 1 per cent. per day. There has been but little disposition to purchase commercial paper, but sellers forced to realize have found accommodating purchasers at a shave of about 18 per cent.

During the week the Treasury has furnished some amusement to the business community by its astounding performances in the matter of resuming specie payments. On Friday it was announced that the Treasury would exchange silver for currency, and those who appreciated the full significance of the announcement were about as much astonished as they would have been had Mr. Secretary Richardson given notice that he would settle the national debt by drawing a check upon his private bankers for the amount of the country's outstanding liabilities. As the Treasury had only $450,000 in silver coin with which to redeem the $50,000,000 of fractional currency and $360,000,000 of legal tenders afloat, and as small silver coin is worth 3 to 4 per cent. premium over currency, while the new trade dollar is quotable at 110 to 112, currency, Mr. Richardson was compelled to resume specie payment in a very small way. Creditors of the Treasury were accordingly notified that when they received payment they might have five dollars apiece in silver if they wanted it. The spirit in which this brilliant piece of financiering was received by the business community may be inferred from a remark made in the hearing of the writer by a prominent merchant. He had collected a bill of $3·50 at the Sub-Treasury, and was asked if he had demanded payment in coin. "No," he replied, "I thought I would not crowd the government—preferring rather to sacrifice my own interests than to place any obstacle in the way of the resumption of specie payments." Another remarked, when shown a handful of silver change, "O, that's nothing! I saw twice as much as that at the Sub-Treasury to-day."

The gold market has been dull, with unimportant fluctuations. The following shows the daily range of the premium:

	Highest.	Lowest.
Thursday	108⅝	108⅜
Friday	108⅝	108⅜
Saturday	108⅝	108⅜
Monday	108⅝	108⅜
Tuesday	108⅝	108⅜
Wednesday	108⅝	108⅜

The stock market has been somewhat depressed by the forced sale of large "blocks," which speculative operators have found themselves unable to carry. The principal dealings have been in Western Union, Lake Shore, New York Central, Rock Island, Wabash and Pacific Mail. The highest and lowest of to-day's quotations for active shares are given below.

Government bonds have been dull and heavy, and close at the prices given below. Southern State bonds and railroad mortgages have been nominal.

The following are the movements in foreign trade for the week:

IMPORTS.

	1871.	1872.	1873.
Tot. for week..	$7,846,357	$7,459,511	$5,830,093
Prev. reported..	313,705,193	355,131,593	328,113,830
Since Jan. 1....	$321,551,550	$362,591,104	$333,943,923

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Brass goods	15	$2,737
Bronzes	32	5,062
Chains and anchors	41	2,235
Copper		4,084
Cutlery	111	50,873
Gas fixtures	1	545
Guns	965	23,476
Hardware	32	3,373
Iron, pig, tons	1,266	49,277
Iron, sheet, tons	11	1,540
R. R. bars	4,521	90,259
Iron cotton ties	5,006	10,797
Iron, other, tons	1,313	47,090
Lead, pigs	4,087	28,977
Metal goods	888	20,117
Nails	30	964
Needles	15	8,207
Old metals		7,068

	Quant.	Value.
Plated ware	1	1,999
Per. caps	11	2,705
Saddlery	9	1,342
Steel	2,577	39,738
Spelter	3,040	155
Silverware	4	595
Tin, boxes	8,808	74,249
Tin, 886 slabs	33,216	9,777
Wire	872	12,316
Zinc	136,494	10,146

EXPORTS, EXCLUSIVE OF SPECIE

	1871.	1872.	1873.
For the week	$5,276,054	$5,366,824	$6,404,434
Prev. reported	189,088,775	183,703,156	238,002,655
Since Jan. 1	$194,364,829	$189,069,980	$244,407,089

EXPORTS OF SPECIE.

Total for the week	$382,972
Previously reported	42,926,473
Total since January 1	$43,309,445

The nominal rates for foreign exchange remain as follows:

	60 days.	3 days.
Prime bankers' Sterling bills on London	106¾@106¾	108¼@108⅜
Good bankers' do	106⅜@106⅝	108 @108⅛
Prime com. sterling do.	105⅜@106	— @ —
Paris (bankers)	5·32½@5·31¼	5·27½@ —
Antwerp	5·31¼@5·32½	5·26¼@5·27½
Swiss	5·28¾@5·28¼	5·23¾@5·23¾
Amsterdam	39⅝@ 39¾	40 @ 40⅛
Hamburg	94 @ 94¼	93¾@ 93⅝
Frankfort	40⅜@ 40⅜	40⅞@ 41
Bremen	94 @ 94¼	93¾@ 93⅝
Prussian thalers	70⅜@ 70⅝	71⅛@ 71¼

Government bonds closed as follows:

	Bid.	Asked.
U. S. 1881s, reg	111⅝	112
U. S. 1881, c., large	113	113⅛
U. S. 5-20, 1862, reg	106	107
U. S. 5-20 1862, c	107	107⅛
U. S. 5-20 1864, reg	106¾	—
U. S. 5-20 1864, c.	108⅛	108¼
U. S. 5-20 1865, reg	107⅞	108
U. S. 5-20 1865, c	108	108⅛
U. S. 5-20 1865, new, reg	109¾	110⅛
U. S. 5-20 1865, new, c	111	111⅛
U. S. 5-20 1867, reg	111	111¼
U. S. 5-20 1867, c	112⅛	112¼
U. S. 5-20 1868, reg	111	—
U. S. 5-20 1868, c	112¾	113
U. S. 10-40, reg	106	—
U. S. 10-40 c	106⅛	107
U. S. 5s, of '81, reg	107	—
U. S. 5s, of '81, c	107⅜	109
30 Year Currency Pacifics	109¾	109⅝

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated	86⅜	85⅜
Lake Shore	64¾	63⅜
Rock Island	89⅝	88
Del., Lack. and West	85⅜	85⅛
Wabash	39⅜	38
Harlem	105⅜	104⅜
Western Union Telegraph	54⅜	52⅝
Northwestern	36⅜	35
Milwaukee & St. Paul	28	25⅛
Milwaukee & St. Paul preferred	60	48
Pacific Mail	31⅜	29⅜
Erie	46⅝	45⅜
Ohio & Mississippi	24⅜	23⅛
Union Pacific	17⅝	16⅜
C. C. & Ind. Central	19⅛	19
Hannibal and St. Joseph	30⅜	20

GENERAL HARDWARE.

There is a better inquiry for General Hardware noticeable since our last writing, but it is too near the close of the month to expect transactions of any magnitude; demand is light and confined to supplying the present wants of the trade. We are pleased to notice the general improvement in remittances, and from present appearances many express the belief that the great stringency in monetary affairs is passed, and that next month will witness the return of trade to its normal condition. A large manufacturer in Philadelphia writes us: "Remittances are improving every day; orders are increasing; the outlook grows brighter," and adds, "the Hardware men are sound."

There is no change to report in the condition of the market for foreign Hardware. The demand is very light and confined strictly to the actual present wants of buyers. Importers, however, express confidence in the future, and believing that the wants of the country are fully as great as they usually are at this season, show little disposition to force sales. Prices of all kinds of foreign Hardware are firm, and in heavy goods the tendency is to further advances. There is no improvement to notice in the demand for Nails, and stocks, although not heavy, are better assorted than at our last writing. The card rate, viz., $4·75 for 10d., is the asking price for lots under 100 kegs, but it is possible to obtain a slight concession from this figure. We quote 10d. to 60d. at $4·75, net, for small lots, and for 200 kegs and upward, $4·50, net, is the minimum price.

Trade in House Furnishing Goods, Tinners' Trimmings, etc., is at a low ebb, and prices are considerably unsettled. In the absence of demand it is difficult to obtain reliable quotations of leading goods in this line. We quote Plain Stamped Tin Ware at discount 20 per cent., and Retinned, discount 25 per cent., but there is little doubt that these figures would be shaded for a fair order. Japanned Dust Pans are offered in case lots at $18 per gross, net, and 9-inch Pie Plates, full cases, at $6 per gross, net. Copper Bottoms are without change, and we continue to quote them at 38 cents per lb., net; for a large order a concession from this figure would be made.

The following circular, which has been issued by Abraham Bussing, Secretary of the Ausable Nail Company, under date of the 24th instant, will explain itself:

Frequent complaints having recently been made to us of the violation of our regulations and *terms of sale* of Ausable Horse Nails, by certain parties in this and other cities, but without sufficient proof to justify a forfeiture of the discounts; and having invariably refused to grant permission to our friends who wish to maintain regular rates, to meet the prices quoted, we desire your co-operation in our efforts to protect the interests of both jobber and manufacturer.

In *all cases* where a violation of our printed terms and regulations can be undoubtedly proved, we will on our part apply the remedy indicated in our terms of sale *without favor or partiality*, and, if necessary, withhold the supply of Nails entirely from parties so offending. If "cutting prices" cannot be prevented, it is desirable that the fact be ascertained, that other measures may be taken to protect those who have been losing sales rather than meet the unfair quotations of their competitors.

We illustrate on another page Pearson's Patent Clamp, made by the Providence Tool Company. The following are the prices, subject to a discount of 5 per cent.:

2 inch opening	Per dozen,	$4·00
3 "	"	5·00
4 "	"	7·50
5 "	"	8·50
6 "	"	11·00
6 " Swivel Clamp	"	12·00

The list prices of Broughton's Double Bottom and Extra Bottom Oilers have been reduced The following are the new prices:

DOUBLE BOTTOM SELF BALANCING SPRING OILERS.

Zinc—No. 1, $3·00 per doz.	All Brass—No. 1, $5·00 doz
" " 2, 4·50 "	" " 2, 7·00 "
" " 3, 6·00 "	" " 3, 9·00 "

EXTRA BOTTOM OILERS.

Zinc Top, Brass Bottom.		All Brass.	
No 1	Per doz. $2·00	Per doz.	$3·00
" 2	" 3·00	"	4·00
" 3	" 4·00	"	5·00
" 4	" 5·50	"	6·50
" 5	" 7·00	"	8.00

EXTRA TUBES PER DOZ.

	Tin.	Brass.
2½ inch	$0·50	$0·75
3 "	0·60	0·90
3½ "	0·75	1·25
4 "	0·90	1·50
6 "	1·25	2·75
9 "	2·50	3·75
12 "	3·00	4·50

Lewis, Oliver & Phillips issue, under date of the 25th instant, the following reduced list of their manufactures. As we received it after the 31st page went to press, the prices there have not been corrected:

Iron, standard list, assorted sizes, for large orders, 3·2c, card rate, 2 % off net.
Flat Rail (1¼x¼), punched and coun'sunk..4·7c ℔ ℔ net
Iron Wedges..5c ℔ ℔ net
Norway Nail Rods..9½c ℔ ℔ net
Crow Bars (in ordering please state whether "Wedge" or "Pinch" point)..6½c ℔ ℔ net
Beetle Rings..9½c ℔ ℔ net
Fence Pickets—
⅝ round, bent to shape..80c ℔ ft. of fence, less 5 % off net
Discount off Standard List.
Carriage and Tire Bolts (new list)..70&5 % off net
Plow Bolts..25 % off net
Stove Bolts..5 % off net
Machine and Square Head Bolts..30 % off net
Coach and Lag Screws..30 % off net
Bolt Ends..25 % off net
Harrow Teeth, in lots of 1 ton or more, packed in casks, 1 in. diam. 4½c ℔ ℔ net; ½ in. diam. 4½c ℔ ℔ net; ⅝ in. diam. 4½c ℔ ℔ net.
Patent Headed Harrow Teeth, packed in casks, ¾c ℔ ℔ ex Skein Bolts, in bulk, in lots of 1 keg or more, ⅝ in. diam. 7c ℔ ℔ net; 9-16 in. diam. 8c ℔ ℔ net; ½ in. diam. 9c ℔ ℔ net. 1c ℔ ℔ extra when less than 1 keg of each size is ordered.
Screw Hook-and-Eye Hinges, ⅝ to 1 in. diam. 9½c ℔ ℔ net; ⅝ in. diam. 10½c ℔ ℔ net; ½ in. diam. 12½c ℔ ℔ net.
Screw and Strap Hinges, in lots of 100 pairs or more, 14 to 36 in. long, 6½c ℔ ℔ net; 8, 10 & 12 in. long, 8c ℔ ℔ net.
Strap and T Hinges..40 % off net, delivered as customary
Screw Hitching Rings..$5 50 ℔ 100 net
Duck Nest Tuyere Irons..$15 00 ℔ doz net
Cast Iron Washers..℔ ℔ 4½c net
Bridge and Roof Bolts—
1 to 2 in. diam. over 3 ft. long..℔ ℔ 4½c net
1 to 2 in. diam. from 4 to 8 ft. long.." " 5 c net
1 to 2 in. diam. from 1½ to 4 ft. long..." " 5½c net
⅞, ¾ and ⅞ in. diam. over 4 ft. long..." " 6 c net
⅞, ¾ and ⅞ in. diam. from 1¾ to 4 ft. long" " 6½c net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ℔ set of 8 bolts.. 55c
12 " ½ " " 8 " " 70c
10 " 9-16 " " 8 " " } 90c
12 " 9-16 " " 8 " "
14 " 9-16 " " 8 " " $1 00
10 in. long by ⅝ at Screw End, ℔ set of 8 bolts.. } 1 00
12 " ⅝ " " 8 " "
14 " ⅝ " " 8 " " 1 10
16 " ⅝ " " 8 " " 1 20
5c ℔ set for each additional inch over 14 in. All lengths made.
Wagon Box Rods, narrow track, each..18c
" " " wide track, each..20c
Single Tree Irons, ℔ set of four pieces..38c
Wrought Iron Bolster Plates, 2¾ in. wide, ℔ set..60c
" " 3 " " " ..65c
" " 3¼ " " " ..70c
" " 3½ " " " ..75c
Wagon Brake Ratchets, each..16½c
" " " finished with guard, each..45 c
Wrought Hammer Straps, heavy pattern, each..16 c
" " " light " each..13½c
" Rub Irons, each..11 c
Stay Chain Hooks, each..9 c
Double and Single Tree Clips, figure 1, each..8 c
" " " 2, each..10 c
" " " 3, each..12 c
Strap Bolts, Rods, Single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks and Clips, in lots of 100 sets..dis 25 %
Wagon Box Staples, 1½ to 2½ in. to clinch, ℔ 100 $12 50 net
" Box Iron, to rivet on, ℔ 100 8 50 net
Neck Yoke Eyes, each..5¼c net
" " with ⅝ rings, each..7 c net
King Bolts, ⅝, 1, 1¼, and 1½ in. diam..℔ ℔ 4¼c net
Wagon Rivets, ex. large, flat, oval and steepie head, ¼ in. diam. all lengths..." 9½c net
Wagon Rivets, 3-16 in. diam., all lengths..." 11½c net
" & Nails, in 5 ℔ paper boxes..℔ ℔ 1c extra
" " in 25 ℔ wood " ..½c extra
Wagon and Hinge Nails, ¼ in..℔ ℔ 17 c net
" " 3-16 in..℔ ℔ 19 c net
Double Tree Plates..
Coupling " } " 9 c net
Tongue "
Neck Yoke Plates..." 12 c net
Tongue Cap Iron, 1¾, 2 & 2¼ in. wide, same price ℔ ℔ as Band Iron.
Wagon Chains, Stay Lock and Tongue, 5-16 in, ℔ ℔ 11½c net; ¼ in., 12½c. net

We invite the attention of Hardware dealers to the advertisement on the 17th page of Dayton & Lamberson's Discount Screw and Bolt Lists. These lists are published in both book and sheet form, and comprise Philadelphia and Common Carriage and Tire Bolts, showing the net prices at twenty different discounts; and Iron Screws, showing the net prices at thirteen discounts, from 25 to 50 per cent. This valuable compilation has had a fair trial by a large number of dealers, and we have seen testimonials from some of the leading Hardware houses in the country, bearing flattering evidence to their usefulness, both as regards correctness and the large amount of time and labor economized by their use. The price for a single copy of either Screw or Bolt List is one dollar; two or more copies, seventy-five cents each. Orders should be addressed to Frank Dayton, No. 83 Duane street, New York.

IRON.

American Pig.—The market for American Iron continues exceedingly dull and unsatisfactory. Prices are very irregular, and it is difficult to arrive at the actual market valuation. The companies generally ask $38 for No. 1, but outside lots are obtainable for cash at still lower figures. No. 2 Extra is held at about $32, at which figure we notice sales of 500 tons Allentown. Forge Iron is abundant, and offering freely at $27. Of the 43 furnaces in the Lehigh, 12 are already out of blast, and five more are expected to go out very soon. Wages have been reduced 10 per cent., and will be reduced as much more on next pay day. A number of miners recently employed at $1·85 a day have offered this week to go to work at $1 a day.

Scotch Pig.—Scotch Iron continues dull and depressed, notwithstanding advices from abroad of light stocks and fully late prices, with no apparent indications of a lower range of values there. There is very little Scotch Iron on the way here, and at present prices no likelihood of shipments. Holders of Glengarnock generally ask $40 from ship, but to force a lot on the market it would not bring that figure; in this way we hear of sale of 200 or 300 tons from dock at about equal to $38·50. Eglinton Iron is scarce, and it is doubtful if much could be obtained below $40, unless it were forced out. Summerlee held at $41; Coltness, $45 @ $46.

Following are the prices of Scotch Pig Iron in Glasgow, as reported by Messrs. J. E. SWAN & BROS., under date of Oct. 10:

	No. 1	No. 3	No. 4
Gartsherrie	125/	118/	....
Coltness	127/6	120/	....
Summerlee	120/	116/	117/6
Langloan	125/	116/	....
Govan	118/	115/6	115/
Calder	*122/6	116/	....
Shotts, Bessemer	160/	155/	....
do Ordinary	122/	117/6	....
Carnbroe	120/	117/	118/
Wishaw	118/	115/	115/
Monkland	118/6	115/6	....
Chapelhall	122/6	....	....
Clyde	118/6	115/6	115/
Quarter—Clyde	118/6	115/6	115/

Glasgow Warrants 3-5, No. 1; 2-5, No. 3, g. m. b. 116/.
*f. o. b. Glasgow, 1/ per ton, extra.

WEST COAST BRANDS—*f. o. b. Ardrossan.*

Glengarnock, Ardeer	120/	117/	....
Eglinton, Lugar, Muirkirk, Portland, Dalmellington—Branded Eglinton	118/	116/	117/
Dalmellington	120/	118/	112/

CURRENT RATES OF FREIGHT ON PIG IRON.

To	From Glasgow.	From Ardrossan.
New York	7/6	7/6
Boston	17/	17/
New Orleans	20/	20/
Baltimore	17/	17/6
Philadelphia	16/	16/
Providence	20/	15/

Bar.—The market continues very quiet for Refined from store, with the demand almost exclusively for small lots.

Old Rails.—The market continues very dull and values unsettled. The stock of Double Head is mostly controlled by one party, and we are informed is not offered at the moment. T Rails are quoted at about $40.

New Rails.—Very little, if any, trade has been effected in New Rails. We quote English at about $60 @ $62, gold, and American about $69 @ $70, currency, though in absence of business these figures are wholly nominal.

We are indebted to Messrs. S. W. HOPKINS & Co., New York and London, for the following statement of the exports of railway iron from Great Britain for the month ending Sept. 30, 1873, and nine months ending at same time, compiled from official sources:

To	M'th. ending Sept. 30. 1871.	1872.	1873.	9 Mos. ending Sept. 30. 1871.	1872.	1873.
United States	54,379	37,732	10,642	380,585	378,053	151,972
British America	8,506	9,080	6,914	56,709	68,739	40,313
Spanish West India Islands	548	20	874	5,026	1,109	4,446
Brazil	963	4,535	15,419	15,745	11,665	
Chili	2,431	490	10,324	2,609	8,855	
Peru	3,144	685	18,403	23,774	7,782	
Russia	3,764	94,646	29,054	69,398	73,587	135,368
Sweden	728	1,644	7,407	8,882	10,453	35,316
Germany	3,527	4,117	1,589	44,149	32,642	94,151
Austrian Territories	3,350			18,591	7,534	816
France	4	150	39	1,716	457	
Holland	445	175	948	9,044	2,254	
Spain and Canaries	2,157	511	1,289	9,969	5,729	
British India	1,595	589	1,497	30,828	10,798	11,969
Australia	225	2,557	3,915	11,607	17,134	17,219
Egypt	728	1,485	1,543	3,152	11,888	6,257
Other countries	7,987	6,664	20,969	57,839	52,691	104,737
Total	93,530	93,393	92,140	756,870	720,970	591,596

Scrap.—The market continues dull. We hear of a lot of 100 tons having sold from dock at $39. Yard lots are nominally held at about $40.

METALS.

Copper.—The position of the Ingot Copper market continues in a very dull and unsatisfactory position. The stocks in hands of dealers and manufacturers are large, and sales can only be forced at exceedingly low figures, and then in only small lots at a time. The transactions the past week include about 200,000 lbs. Lake, in lots, at 22½c. @ 23c., and rumors of 25,000 lbs. at 22c., cash. Baltimore Copper has been quiet, and we do not hear of any further important transactions. Cash lots are held nominally at 21c. For future delivery the market is entirely nominal. Manufactured Copper is dull, but prices remain unchanged. We quote at 36c. for New Sheathing, 40c. for Braziers, 45c. for Nails, 20c. @ 21c. for Old Sheathing, 26c. for New Yellow Metal Sheathing, 32c. for Bolts, and 27c. @ 30c. for Nails, Sheathing and Slating. Bolt Copper, 40c.

Tin.—The market for Pig Tin continues dull and depressed, and only small lots are changing hands. We quote Straits, 29c.; English L. and F., 27c.; English Refined, 28c., and Banca, 33c., all gold. Tin Plates are lower again, leading to a trifle more business, though the market is far from active, as the sales have all been in small lots. Charcoal Terne is scarce. We quote: Charcoal Tin, $9·50 @ $9·75; Coke Tin, $7·25 @ $8; Charcoal Terne, $9·50 @ $9·75; and Coke Terne, $6·75 @ $7·50.

Lead.—The market has been extremely dull the past week, and sales limited to a few very small lots for urgent requirements. We quote: German and Spanish ordinary at 6¾c. @ 7c.; English, 7c.; foreign refined, 7¼c. @ 7½c., and domestic, 6⅝c. @ 6½c., all gold. Manufactured Lead is quiet and unchanged. We quote Bar at 9¼c.; Sheet and Pipe at 10½c., and Tin Lined Pipe at 16½c., less the usual discount to the trade.

Spelter and Zinc.—Very little, if any, trade of importance has taken place in either foreign or domestic Spelter, and prices, though quoted about the same, must be considered nominal. We quote: Silesian, 7½c. @ 7¾c., gold, and domestic Plates, 8c. @ 8¼c., currency. Sheet Zinc is quiet and unchanged; dealers ask 8½c. @ 8¾c. net, gold.

Antimony.—The demand for Regulus continues very quiet, and sales only effected in a retail way. We quote at 13c. @ 13½c., gold.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending October 28, 1873:

Hardware.

Boker Hermann & Co.
Mdse. pkgs., 22
Casks, 8
Cutlery, cks., 4
Cases, 4
Beam & Murray,
Casks, 1
Chains, cks., 17
Cases, 4
Carr H. W.
Casks, 3
Coffin, Lee & Co.
Mdse. pkgs., 5
Drexel, Morgan & Co.
Cutlery, pkgs., 2
Dickinson Henry
Packages, 5
Casks, 2
Degraw, Aymar & Co.
Chains, 32
Chains, cks., 8
Faber E.
Cases, 1
Field A & Co.
Per. caps, cs., 4
Packages, 38
Foot, Homer & Co.
Files, pkgs., 10
Folsom H. & D.
Arms, cs., 5
Fisher J. S.
Casks, 1
Friedmann & Lauterjung
Cutlery, cs., 11
Harmar Wm. & Co.
Cases, 4
Jackson Wm.
Casks, 2
Lau & Garlichs,
Mdse. pkgs., 3
Laughland & Co.
Wire, pkgs., 26
Mason John W. & Co.
Wire rope, coils, 7
Moore's J. P. Sons,
Guns, cs., 3
Nichols Henry G.
Packages, 2
Russell & Erwin Mfg. Co.
Files, cks., 2
Remington E. & Sons,
Gun barrels, cks., 10
Robbins C. & Son,
Mdse. pkgs., 16
Tillotson L. G. & Co.
Wire, galv., lots, 657
Schoverling & Daly,
Mdse. pkgs., 3
Signeer R. J. & Co.
Packages, 2
Stevenson Thos. F.
Files, cks., 24
Strasburger, Pheiffer & Co.
Cases, 3
Sawyer John,
Wire rope, coils, 10
Turnor R. A.
Mdse. pkgs., 14
Van Nest A. R. & Co.
Cases, 2
Van Wart & McCoy,
Cases, 5
Casks, 2
Files, cks., 1
Western Union Tel. Co.
Wire, gal. lots, 666
Order.
Packages, 13
Casks, 5
Files, cks., 15
Without bills of lading.
Chains, cks., 28

Iron.

Congreve Chas. & Son,
Rails, 767
Fish plates, bdls, 2459
Crocker Bros.
Pig, tons, 100
Darrell & Co.
Old iron, casks, 2; tons, 2
Henderson Bros.
Pig, tons, 300
Holdane J. H. & Co.
Tubes, wrought, 500
Jarvis Geo.
Fish plates, bdls, 1000
Rails, 673
Bolts, cs., 64
Chairs, bdls., 1057
Lidgerwood H.
Old, lbs., 80,000
Laughland & Co.
Haybands, bdls., 810
Milliken S. Jr.
Rods, bdls., 256
Morton, Bliss & Co.
Rails, 494
Naylor & Co.
Fish plates, bdls., 350
Rails, 880
Phelps, Dodge & Co.
Sheet, pkgs., 9025; bdls., 217
Seligman J. & W.
Rails, 645
Order.
Pig, tons, 700
Sheet, pkgs., 66
Cotton ties, bdls, 8000
Bundles, 280

Steel.

Brown Bros. & Co.
Bundles, 689
Bruce & Cook,
Wire, bdls., 10
Steel iron, bdls., 600
Hogan John,
Cases, 46
Casks, 3
Hugill Chas.
Packages, 32
Justice P. S.
Bessemer bars, bdls, 67
Lang W. Bailey & Co.
Crank pins, 48
Merchants Dispatch Co.
Casks, 2
Moore Henry,
Casks, 15
Naylor & Co.
Axles, 56
Tires, 14
Cases, 25
Bundles, 480
Bessemer rails, 776
Frog points, 6
Prosser Thos. & Son,
Tire forgings, 25
Van Wart & McCoy,
Pieces, 59
Packages, 1
Order.
Rails, 1923
Bundles, 810
Bars, 85
Cases, 2
Without bills of lading.
Bundles, 112

Metals.

Bruce & Cook,
Scrap lead, cks., 18
Cort N. L. & Co.
Terne plates, bxs, 250
Tin plates, bxs., 330
Darrel & Co.
Old, cks., 5; cs., 2
Old copper, bbls., 1⅛
Old lead, bbls., 2
De Rivera & Co.,
Old copper, bxs., 19; hhds., 3; pkgs., 2
Naylor & Co.
Tin plates, bxs., 900
Phelps, Dodge & Co.
Tin plates, bxs., 9471
Tin, ingots, 360
Societe de Credit Suisse.
Tin plates, bxs., 1165
Order.
Lead, pigs, 7957; pcs, 3633
Tin, ingots, 317
Spelter, slabs, 340
Tin plates, bxs., 3154
Without bills of lading.
Tin plates, bxs., 639

PHILADELPHIA.

Messrs. LLOYD, SUPPLEE & WALTON, under date of Oct. 28, write us as follows: We can report a slight improvement upon trade during the past week, although far from being what is wished for. Parties are buying only what their immediate trade requires, and in small quantities. The near or local trade are ordering more through mail than by orders given in person in the city. We can see some little improvement in remittances, and a much better feeling for the future than shown two weeks ago. Prices remain without any decided change. Philadelphia Bolts remain at the low price before quoted. Eastern and Western Bolts also remain at the same low figure as before quoted. Genuine Emerson Razor Strops have advanced, and are held at 25 per cent. discount. Other goods remain without any change from our quotations.

Messrs. BLAKISTON & COX, Iron Merchants, 333 Walnut street, under date of Oct. 28, 1873, report as follows: Business in all branches of the Iron trade is depressed, and the week just past has developed no feature tending to a reaction for the better. In Pig Iron few sales worthy of particular mention have been made, being confined to lots of 100 tons, and less. A recent visit to near markets has found them much depressed, and an extended investigation has made us acquainted with the fact that consumers have small supplies, and in the absence of orders this is necessary as a measure of prudence. The furnace companies are still blowing out, and are all more or less reducing the production; their present stock on hand, with the lessened production, will be ample to fill balance of orders for this year's delivery, and supply any ordinary demand that may be made upon them. Below are the present prices quoted for all the brands offered in this market: No. 1 Foundry, $35 to $40; No. 2 Foundry, $32 to $34; Gray Forge, $28 to $30, delivery here, freights from furnaces being about $2. In consequence of the great reduction of stocks of English and Scotch Irons on the other side, prices have there become firmer, and the demand, which is reported active, is likely to occasion higher prices and stop the supplies for this country for some time. This will have an effect upon the value of American Irons, and tend to firmer, if not better, figures. We quote Eglinton No. 1 at $47 and Glengarnock No. 1 at $49 to $51, small lots, from yard. In *Scrap Iron* there is nothing doing, and prices remain without material change. *Bar Iron* sells as last quoted, and is without any new feature. We hear of inquiry for *New American Rails*, but owing to the difficulties of using paper and securities—no matter how good—with which we are all acquainted, the inquiries amount to little. We quote New American at works at $69 to $70, nominal.

PITTSBURGH.

PITTSBURGH, Oct. 25.—There is no improvement to note in the Pig Iron trade so far, and while hopes are entertained that there will soon be a change for the better, the prospects at this writing are not very encouraging. As noted in my last, consumers, without an exception, are buying just as little as they possibly can, and this policy it is almost certain will be rigidly adhered to until there is an easing up in money matters. Our manufacturers nearly all have more or less paper out, and they have hard enough work in taking care of this without increasing it; and, futhermore, sellers, in view of the fact that the banks are still refusing to discount, are not disposed to sell on time. Cash buyers, as might be expected in times like these, are few and far between. During the past week trade has been at a dead lock; there was scarcely enough business transacted to establish quotations. Prices are weak, though nominally unchanged. Choice Mill Irons may be quoted, in the absence of sales, at $32 to $33, 4 months; No. 1 Foundry Iron, $38 to $40; No. 2, $32 to $34; White and Mottled, $29 to $31; Charcoal Irons, $45 to $50 for Warm, and $60 to $65 for Cold Blast. Blooms $90 to $105, according to quality. The arrivals of Pig Metal have fallen off largely, producers preferring to keep it at home until there is a demand for it, and it is said that a large number of the furnaces in the Shenango and Mahoning valleys have blown out, and unless there is a very decided change in the situation, they will all have to do likewise. There is no demand for product, and, beside, even if there was, there is no margin at present quotations. This has been a bad year on the furnaces; trade opened bad, has been dragging ever since, and the indications are that it will close even worse than it opened. However, it is said that it is always darkest just before the break of day, and it is

hoped that the clouds which are now hanging over the country will soon break up and disappear, and that trade generally, iron included, will be placed on a strong and better basis. The demand for finished irons continues meagre compared with what it was prior to the panic. It is true none of the mills have stopped entirely, but they are only running single turn, and had it not been for an accumulation of orders before the financial troubles set in, the probability is that some of them would have been obliged to shut down before this. There is one point in favor of our manufacturers, and it is an important one—stocks both in first and second hands are reported light, and they appear determined to keep them so. The probability is that, as soon as orders stop coming in sufficiently to keep the mills going, they will suspend. The card rate was reduced this week from 3 and 8-tenths to 3 cents and 3-tenths for bars, usual time, with two per cent. off for cash. It is but proper to state that the card has been considerably above the selling rates for several months, and the change was made chiefly for the purpose of bringing down the cost of skilled labor, which is governed entirely by the card, as per agreement between the mill owners and the workmen. It is what is called the "sliding scale." The Nail trade is gradually falling off, and prices are weaker in sympathy with the raw material. The card remains unchanged at $4·50, but it is said that orders are being accepted under this rate. Stocks, however, are light, both here and at Wheeling, and, as in the case of finished irons, it seems to be the policy of manufacturers to keep them down. The Steel trade, like everything else, has been curtailed considerably by the disturbed condition of finances, but the mills are still in operation. As regards prices, there have been no recent changes. The demand for manufactured Copper is light, but prices remain unchanged. There is a rather firmer feeling in Window Glass, as stocks are gradually being reduced, and the factories having been stopped since last July, with no indication of their starting up soon again, prices are tending upward. Some houses are having a good deal of trouble in filling their orders, as their stock of many sizes is exhausted.

Your correspondent heartily endorses the correction which appeared in *The Iron Age* of last week, in regard to the rumor which he unfortunately and thoughtlessly gave currency to, relative to the suspension of Mr. Springer Harbaugh, senior member of the firm of Harbaugh, Mathias & Owens, proprietors of the Superior Rail Mill. As stated in *The Iron Age*, it had no foundation whatever in fact, and, as might be expected, Mr. Harbaugh feels deeply aggrieved at its publication, although I am sure he does not regret it any more than I do.

The *Commercial*, of the 25th inst., says: The condition of the Pig metal market remains about the same as at date of last report. The commission merchants report no sales, and say there has not been enough sales made to establish a market price, therefore it is difficult to say what metal is worth in this market now. Gray Forge is held by the owners at $31 to $33 per ton, 4 months, without finding buyers, while cash buyers say they can buy at $30, 4 months, with liberal discount for cash. Most of our rolling mills are still in operation, but they are working on orders received before the panic, and using up pig iron bought some time ago. When these orders are filled, or present stock exhausted, they must stop work, unless trade revives in the meantime.

LOUISVILLE.

Mr. GEO. H. HULL, under date of Oct. 27, writes us as follows: Market dull and lower; quotations on some grades must be regarded as nearly nominal. Sales are confined to small lots for immediate use. A considerable concession is made on cash sales. The usual time, four months, is allowed on quotations below:

HOT BLAST CHARCOAL.

No. 1 F'dry, from Hanging Rock Ores	$47·00 @ 48·00
" 2 " " " "	42·00 @ 44·00
" 1 Forge, " " "	34·00 @35·00
" 1 F'dry, from Tennessee Ores	46·00 @ 47·00
" 2 " " "	41·00 @ 43·00
" 1 Forge, " "	34·00 @ 35·00
" 1 F'dry, from Alabama Ores	46·00 @ 48·00
" 1 " " Iron Mountain Ores	48·00 @ 50·00

HOT BLAST STONE COAL.

No. 1 F'dry, from Missouri Ores	44·00 @ 45·00
" 2 " " "	40·00 @ 42·00
" 1 Forge, " "	33·00 @ 34·00

COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores	60·00 @ 62·00
" " Tennessee Ores	58·00 @ 60·00
" " Alabama Ores	60·00 @ 62·00
" " Georgia Ores	60·00 @ 62·00
" " Missouri Ores	58·00 @ 60·00
" " Kentucky	56·00 @ 62·00

CINCINNATI.

Messrs. ADDY, HULL & Co., under date of Oct. 27, write us as follows: The market has undergone no improvement during the past week. Buyers are making no engagements for future delivery, and orders for immediate consumption are light, owing to restricted operations of mills and foundries, caused by the financial stringency. Quotations as follows:

HOT BLAST CHARCOAL.

Hanging Rock No. 1	₩ ton..$45·00 @ ..	—4 mos.
" " No. 2	43·00 @ 44·00	—4 mos.
" " Forge	35·00 @ ..	—4 mos.
Tennessee No. 1	44·00 @ ..	—4 mos.
" Forge	35·00 @ ..	—4 mos.
Alabama No. 1	44·00 @ 45·00	—4 mos.
Missouri No. 1	45·00 @ 46·00	—4 mos.
" No. 2	43·00 @ 44·00	—4 mos.

HOT BLAST STONE COAL.

Missouri No. 1	₩ ton..$43·00 @ ..	—4 mos.
" Forge	34·00 @ ..	—4 mos
Ohio No. 1	42·00 @ ..	—4 mos.
" Forge	30·00 @ 33·00	—4 mos.
Scotch Pig, No. 1	.. ..	..

COLD BLAST CHARCOAL.

Hanging Rock Car Wheel	₩ tn.$60·00 @ 66·00	—4 mos.
Missouri " "	59·00 @ 60·00	—4 mos.
Kentucky " "	62·00 @ 65·00	—4 mos.
Tennessee " "	58·00 @ 60·00	—4 mos.
Georgia " "	60·00 @ 62·00	—4 mos.
Alabama " "	60·00 @ 62·00	—4 mos.
Machinery and Forge	55·00 @ 57·00	—4 mos.
Blooms	105·00 @ 110·00	—4 mos

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, corner of South Charles and Lombard streets, report us the following prices under date of Oct. 28, 1873: Trade remains much as reported last week; prices are weak and drooping, and dealers prefer letting their stocks run out, rather than replenish same for the present. Good orders can be booked at less than cost to either manufacturer or dealer. Quotations are nominal in character.

AMERICAN REFINED BAR IRON.

1 to 6 wide by ⅜ to 1 thick	3¼c. to 4c. per lb.
1 to 4½ wide by 1⅜ to 2 thick	
Round and square, ordinary sizes, from ⅜ to 2 inclusive	3¾c. to 4c. "
Hoop Iron, 1½ wide and upward	5¼ to 5½c. per lb.
Band Iron, from 1½ to 4 in. wide	4¾ to 4¾c. "
Horse Shoe Iron ⅜ to 1 wide by ⅜ to ⅝ thick	5 to 5¼c. "
Norway Nail Rods	8¼ to 8½c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	16¼c. "
Machinery Steel	11¼c. "
Cast Spring Steel	11c. "
Homogeneous Steel Plate	13c. "
Perkins' Horse Shoes, per keg of 100 lbs	$6·37½
" Mule Shoes " "	7·37½

Common Horse Nails, from 14c. to 18c per pound.

	10	9	8	7	6
Putnam Horse Nails	23	24	25	26	28c. per lb.

R. R. Spikes.....5¼ by 9-16 at 4¼c. to 5c per lb.

CLEVELAND.

Messrs. REDDINGTON & ADAMS, under date of Oct. 27, write us as follows: The Pig Iron market shows some depreciation, both as to price and sales, although orders are coming in continually for small lots. Most of the furnaces in this vicinity are requiring extensions on their ore paper. A large number of the furnaces have blown out, and a trip through the Mahoning and Shenango valleys presents a very unusual appearance of things. It is confidently believed that the stopping of so many furnaces, and the consequent decrease in manufacture, will have a tendency to make prices buoyant by reducing stocks in hand. Quotations are nominal merely. We quote as follows:

LAKE SUPERIOR CHARCOAL FOR CAR WHEELS AND MALLEABLE USE.

No. 1	$	@ 50 50—4 m.
No. 2		@ 48 50—4 m.
No. 3	graded 53 50 @	—4 m.
No. 4	60 50 @	—4 m.
No. 5	60 50 @	—4 m.

COLD BLAST CHARCOAL.

No. 1 Tennessee	$60 50 @ —4 m.

ANTHRACITE.

No. 1 Onondaga	$43 50 @ —4 m.

BITUMINOUS IRON FROM ALL LAKE SUPERIOR ORE.

No. 1 f'ndry, acc'ding to brand	$38 50 @ 41 50—4 m.
No. 2 " " "	35 50 @ 37 50—4 m.
Gray Forge	30 00 @ 33 50—4 m.

BLACKBAND IRON FROM WAREHOUSE—SCOTCH.

No. 1 Glengarnock	$45 50 @ —4 m.
No. 1 Eglinton	45 50 @ —4 m.
No. 1 Ayresome	43 50 @ —4 m.

AMERICAN.

No. 1 Massillon	@ 42 50—4 m.

IRON ORES.

Lake Superior specular	
Forsythe	

FOREIGN.

GREAT BRITAIN.

Messrs. J. Berger Spence & Co., London, Glasgow and Manchester, under date of Oct. 11, 1873, report:

Metals.—Business in this market has been steady throughout the week, and although the orders that are placed are not very large, they appear sufficiently ample to keep manufacturers fairly employed, which in the present position of the "fuel and labor" question is perhaps all that can be esired. Scotch Pig Iron Warrants have not changed much in value, but makers' Iron has in some instances been advanced. The shipments for the past week are reported as 11,205 tons, against 12,071 tons in the corresponding week of last year. For Middlesborough Pig Iron the demand is quiet and is freely met by the smelters. The quarterly meetings of the Iron trade have been held both in the North and in Staffordshire during the week, but the uncertainty attendant upon the action the men may take in the wages dispute has seriously interfered with the trade in manufactured Iron; and until Mr. Kettle's decision anent the men in the Cleveland district is made public, there does not appear much probability of any improvement taking place. Copper is in better demand, the recent depression has been followed by an increased inquiry, and higher prices are now freely paid. Tin is lower, the standard has been again reduced in Cornwall, and Straits and English have suffered proportionately. A large business is going on in Lead, and higher values may be anticipated. There is not much doing in Spelter, nor is there much variation in rates.

IRON—"Ayresome" Yorkshire Pig Iron, No. 1, 107/6; No. 2, 102/6; No. 3, 100/; No. 4 (Foundry), 98/6; No. 4 (Forge), 97/6 net cash, or 2/ extra 4 months' bills. Scotch Pig warrants, 115/ to 117/. Staffordshire Bars, £12. 10/ to £14. Hoop Iron, £13. 10/ to £14. Gas Tubes, 47½ per cent. off new list. Boiler Tubes, 17½ per cent. discount.

COPPER.—English Tough Ingot, nominal, £92 to £94. Chili Bars, £85 to £86.

TIN—English Ingot, nominal, £126 to £128. Straits, £120 to £122.

TIN PLATES.—Best Coke, I. C., 32/ to 35/; Charcoal, I. C., 36/ to 40/ per box.

LEAD.—Best English Soft Pig, £23. 15/ to £24. Refined Red Lead, £25 to £27.

ANTIMONY.—French Star, £59 to £60.

SPELTER.—Silesian, Special Brands, £27. 10/ to £28. English, Best Brands, £27. 10/ to £28.

FRANCE.

(*Moniteur des Interets Materiels.*)

PARIS, October 12, 1873.—Although, from a financial point of view, there may be an improvement both in England and the United States, the unfavorable impression produced by the disasters at New York still exists, aggravated by the shifting policy of the Bank of England. Its last statement has given a wholesome warning to the speculators, who now seem to deem it prudent to adopt a more expectant attitude. So far as Copper in particular is concerned, this metal has been all the more easily influenced, as it was in reality weak enough when the financial cloud appeared. But for the limited extent of dealings, prices would have given greater signs of demoralization. Toward the close greater animation is observable at sustained prices, in sympathy with the decision of the Bank of England not to raise its discount any further for the present. At Paris, Copper is firmer at 223½, deliverable at Havre. Havre and Marseilles have been quiet and unaltered. Germany has dealt but moderately in the metal; unfavorably impressed as that country has been by the events at New York, the fluctuations have been both wide and frequent. Holders have been quite willing to give way in their demands. Berlin is rather quiet at 30¾ to 31¼ thalers. Stettin is 31 to 32. While going to press, England telegraphs greater firmness and animation. Tin is passing through a phase of extreme difficulty. Speculators seem to have altogether lost the track of the metal, and seem determined at length to indulge in a masterly inactivity, till some additional light is cast upon the precise facts of recent Australian production. The doubtful point seems to be just now, what it costs to produce Tin in Australia. And, furthermore, the Tin Ore lately placed upon the markets of Australian extraction, having varied most strikingly in richness, the statistical points escape all control. Some yield £15, and others £90. London has thus become excessively quiet, and Liverpool decidedly weak. Holland has been utterly demoralized, partly owing to the change in the system of holding the Trading Co.'s rates. At Rotterdam, New York occurrences have had a most beneficial effect on the Tin market, but they seem to think that bottom has been touched. Tin, at Paris, has been seriously affected, too; Banca is 340, Marseilles is quiet at 345. Germany is weak throughout: Berlin at 44¼ to 44¾, Stettin at 46 to 47, for Banca. Penang, Oct. 4, $33·25; Singapore, same date, $34·25. At the Batavia, 30 Sept., sale, the average has been 79·66, against 85·46, Aug. 16. Lead remains steady at London, and firm at Liverpool. Paris and Havre are well sustained at 60 to 60½. Marseilles has been suddenly stopped in its upward course by ill defined causes, there being no arrivals from Spain, but we presume there is a lack of export demand. Germany as firm as ever; Berlin firm, at 8 to 8¾; Stettin, 7 11-12 to 8¾. At Amsterdam, Stolberg is moving off steadily at 14. Spelter is lively in England; London shows a 327 ton stock, against 1190 in 1872, and Grimsby 380, against 600. Liverpool, on the other hand, is heavy. Paris is well sustained, though inactive. Marseilles is remarkably quiet. Little transpiring in Germany; still, there is no wavering in prices. *Iron.*—The same listless state of affairs, hitherto referred to, persists in the general position of the metal in France. Offerings are all along in excess of the demand to take care of them. With the sole exception of Rails, the outlook is anything but encouraging. Pig Iron is weak and drooping. Wrought Iron is being sold in restricted quantities only, and if there are some works with a show of firmness, there are others but too willing to cave in below semi-official price lists. The Ardennes are at 270 to 280; Coke Pig, 115 to 118. The Meurthe and Mosselle are 100 to 115. *Coal.*—The grocers of France are forced, by the approach of winter time, to lay in their little stocks, which circumstance spreads a certain degree of activity throughout the republic, without leading to a further appreciation in value. At the North half-greasy commands 40 francs, Furnace Coal 28, and washed Coke 60. The Pas-de-Calais has now eighteen mines in operation, and the North twelve. At the North the importation of Coal from Belgium has, since 1845, risen as follows: In 1845 we imported 12,394,000 quintals; in 1855 the amount rose to 27,300,000; in 1865 to 33,656,670, and last year to 37,420,500.

(*Cote Libre.*)

ST. DIZIER, Oct. 8, 1873.—Things seem to be slightly mending in this vicinity. Sales are effected with greater ease, and although the transactions are far from being extensive, orders begin to drop in from all quarters for a replenishment of assortments. The most notable feature is the urgency of these demands, immediate execution being prescribed in all cases, abundantly showing that stocks in the hands of dealers have begun to run low. The apprehension of a further decline seems to have vanished, yet they do not venture as yet upon "futures," and seem willing to run the risk of paying more two months hence.

(*Le Commerce.*)

PARIS, Oct. 16, 1873.—*Metals*—Although the general metal position is far from satisfactory, there is a slight amelioration perceptible. Unfortunately however, it is hardly to be expected that while Coal remains high, increased activity, such as we have had it the past few days, will be anything but the result of some pressing momentary wants, to disappear again after they shall have been attended to. We ought, nevertheless, not to despair. Metallurgical interests of such vast proportions are exuberant in resources and expansive, and with a little patience we shall soon be launched once more on the road to prosperity. While general metal industry has been stagnant among us, some specialties administering to and protecting metal have had all the more attention bestowed upon them, and prominently among them Composition Paint. Twenty-five per cent. of the swiftness of vessels under sail or steam is lost by an accumulation of barnacles, and after the Roux, Daft and Mullay compositions have been declared insufficient, the Rahtjen composition has attained great fame in our merchant marine and navy, and is likely to supersede all others as the one most efficacious. Great efforts are also being made to come up to recent inventions made in Germany accelerating the speed and increasing the power of locomotives. We hear from Madrid that the Secretary of the Exchequer has published the decree which imposes an export duty of 5 per cent. *ad valorem* on all shipments to foreign countries, and of 2 per cent. on those to Spanish possessions across the seas. Aside from this duty, all the Iron and Coal mines of Spain are to pay a 3 per cent. tax upon their net production. All other mines are to pay 5 per cent. This will add 10 per cent. to the cost of Spanish Lead, between the duty and tax, to import it from that country.

BELGIUM.

(*Le Commerce.*)

BRUSSELS, Oct. 9, 1873.—*Iron.*—Business in Iron seems to be on the wane in Belgium as we proceed, and while buyers withdraw from the market, offers multiply and become more pressing. Prices are weakening, as may be supposed. *Pig Iron* is, especially, feebly sustained, and currently sells at 150 francs, with occasional shadings to 145. Refined is also ill supported. Wrought Iron is going from hand to mouth only, and merely for replenishing assortments at 250 to 260, No. 1. Rails are in tolerably good request, not, however, at remunerative rates. Rolling mills, it should be remarked, however, are steadily at work. *Coal.*—The Coal trade in Belgium is now getting on smoothly, and to the evident satisfaction of all concerned, with the exception of the item of "transportation." Under this chapter a good many complaints are heard. The public necessities do not seem to meet with the consideration due them, or at least this care for the wants of Belgian trade and industry is meted out in a derisive manner. Year after year we have the same dilemma, and we merely allude to it by way of memorandum, feeling beforehand convinced that no remedy worth mentioning will be had in the premises as long as our Chambers of Commerce remain apathetic and fail to bring a wholesome amount of pressure to operate upon the public mind, upon our legislative chambers, and through them upon the government and its ministry. In the Charleroi region prices show little or no change, with a steady run of business. There has been some increase of production, but not sufficiently so for an accumulation of stock. In the Liege region prices are firm, with a slight inclination toward improved rates of Coal for household purposes. There has been an augmentation of production in this district likewise, but not to such an extent as to affect values, the less so at a moment when the approach of cold weather keeps up a certain degree of animation. Navigation is now quite steady, and there have arrived at Jeumont, from the Charleroi mines, 246 river boats during the past four weeks, with 49,582 tons of Coal on board.

GERMANY.

(*Borsenhalle.*)

HAMBURG, Oct. 10, 1873.—*Metals.*—*Lead* is sustained, but the inquiry is slight; German, 25 to 26 marks; English, 26·30 to 26·50 marks. *Copper* is weak; Northern Sorts, 96 to 105; Minnesota, 126 marks. *Tin.*—Inanimate; Banca at 1·48, English at 1·38 to 1·40, Rods at 1·42½ to 1·45. *Spelter.*—Nothing doing, tendency weak at 27 marks.

HOLLAND.

(*Wm. Brummer, Schroder & Co.*)

ROTTERDAM, Oct. 14, 1873.—*Tin.*—The market is dull. In consequence of lower quotations in England, Banca has been sold, late sale conditions, at 72½ to 72 guilders, and at the same figure deliverable from the coming November auction: furthermore, from the February sale, 1874, at 71 to 70½; and Billiton on the spot and loading at 70½ to 70.

PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, Oct. 27, 1873.

The improvement spoken of in financial circles, if such there be, has not reached the manufacturers of this city, whose case is a bad one, and who are gradually shutting down entirely in production. In this the iron trade is not alone, for manufacturers in all branches are following the same course. The carpet trade, which in this city is very extensive, and gives employment to thousands of people, and is among the largest buyers of machinery, is stopping all the mills, owing to the unwillingness of manufacturers to pile up stocks. It is a fact not generally known, that we have in the city of Philadelphia alone more carpet looms running than are in operation in all Great Britain, and some idea may be formed from this of the number of operatives thrown out of employment by the stoppage of the mills. The same thing as to stoppage is true of the cotton mills, all or most of which are running on short time, and at reduced wages. The winter at hand must be a hard one on the working classes, few of whom have laid by anything for an idle day, and those manufacturers who have discharged their hands and are the owners of the dwellings occupied by them, will do well to reduce the rents of such. This movement has been made by one cotton mill owner of the city, who, while compelled to stop his works, has lowered the rents of all his dwellings ten per cent. There is little doubt that the calls for aid will be loud and urgent during the coming winter, and the increase in crime, always attendant upon dull times, is already apparent.

One direct evil of the panic has been the way in which many innocent or ignorant holders of the really good investment stocks have been frightened into sacrificing them. Thus Pennsylvania Railroad stock has been persistently hammered down to $45 per share, some twenty per cent. lower than it has previously sold, and without reason or right. This is a safe, sure, ten per cent. investment, and is always held as a favorite. The company was never doing so large a business as now, as is shown by the following figures: The receipts for September were $2,468,076, being an increase over those of September, 1872, of $397,651. For the nine months ending October 1, the receipts were $18,720,807, being an increase over the like period of last year of $2,501,757. Here is a business of at least $25,000,000 a year, out of which the expenses form a lesser proportion than with most other roads, and there is no reason to doubt that the usual semi-annual dividend of five per cent. will not be paid. These facts should deter those who hold such stocks as investments from sacrificing them under the impulse of a panicky market. Generally, however, an improved feeling is noticeable on the street. The resumption of business by the well-known banking house of E. W. Clark & Co., on Saturday, was greeted with favor on all hands. This firm has always been popular, and their assets were shown to be so far in excess of their liabilities that their creditors promptly acceded to the terms proposed, on which they could resume. The Jay Cooke proposal does not meet with as much favor, and their creditors are opposing the extremely loose powers given the proposed trustee in some very sharp cards to the newspapers.

THE BUFFALO, NEW YORK AND PHILADELPHIA RAILROAD.

Considerable interest has been excited by the opening of this route, giving a new outlet from this city to Buffalo and the Lakes, and, above all, that Buffalo is thus brought 24 miles nearer to this city than to New York, the last, a matter of very little consequence, were the road in the hands of any company but the Pennsylvania, which is able to compete with existing trunk lines. The figures of the trade and manufactures of Buffalo, as given in connection with this road, show that a closer connection is highly desirable for our manufacturers. Those relating to iron are especially noteworthy, and were as follows during 1872: Receipts of iron ore, 19,934 tons; pig iron, 6985 tons; scrap, 2664 tons; railroad iron, 2190 tons; and bars and plates, 360 tons. It would seem probable that this connection would, in the future, allow of greatly increased Lake shipments of anthracite coal, and possibly, also, of the charcoal irons of Lake Superior to our Eastern iron works. At all events, in this season of depression and suspension, it is cheering to know of the opening of any new enterprise which will encourage trade.

WEST VIRGINIA TRADE.

A delegation of citizens of Martinsburg, West Virginia, has been here during the week celebrating the late opening of a new link of railroad added to the Cumberland Valley Road, which passes through Western Maryland, via Hagestown, and opens connection to the Potomac at Martinsburg with the Susquehanna River at Harrisburg. This road runs through a fine agricultural country, and one also rich in iron ores, which will ultimately reach the Susquehanna furnaces.

IRON SUIT.

A case of breach of contract in the iron trade was tried in the District Court during the week, which was of some interest. The plaintiffs, Messrs. Harbaugh, Matthias & Owens, of the Superior Rail Mill, Pittsburgh, sued Zachariah P. Boyer, of Pottsville, for failure to deliver a quantity of iron, amounting to 1000 tons, during 1872. Plaintiffs alleged that in November, 1871, defendant contracted to deliver, at a certain price, 1000 tons of iron to them during the months of February, March and April, 1872, but between the time of the making of the contract and the time fixed for the delivery of the iron, the price of the article rose, and the defendant failed to comply with his contract. Plaintiffs then brought suit to recover the difference in price, which they were compelled to pay by reason of the alleged breach of contract. After trial a verdict was rendered for plaintiffs of $10,129·75.

NEW ICE BOAT.

The approach of winter, with the frequent difficulties with ice gorges in the Delaware River, brings the subject of ice boats before the public. The increased number of steamships sailing from this port, and the activity of the grain and petroleum shipments, render an open river highly necessary to our commerce. A new ice boat, making the third of the line owned by the city, has just been completed at the yard of Messrs. Wood & Dialogue, in Camden. This vessel is entirely of iron and cost $345,000. Her dimensions are as follows: Length, 211 feet; breadth of beam, 33 feet; depth of hold, 15 feet; diameter of wheels, 24 feet. She is fitted with two engines, with 50 inch cylinders and 9 feet stroke. There are eight boilers of great capacity, the engines being compound. This boat, in connection with the former two, which are now being overhauled at the same yard, will, doubtless, give us an open river, even if the hyperborean season predicted by the weather-wise should come upon us.

IMPORTS FOR SEPTEMBER.

The official list of imports to this port for the month of September last shows a very considerable decrease, compared with those of the same period of 1872. The total value being $1,861,089, against $2,435,361 in 1872. The items of pig iron $99,483, and tin plates $112,696, being the only ones given in the metal line.

ACTIVITY AT THE MINT.

Unusual activity has been shown at the Mint lately in coinage of all classes, and the remarkably easy positions held there by operatives have of late been something more than sinecures. It is evident that the government is doing its best to prepare for the possibility of specie payments, and is keeping all the mints running to the full capacity of their machinery. The San Francisco mint has lately been supplied with some improved machinery from here, manufactured for the government by Morgan, Orr & Co., of this city, who now make nearly all this work for our mints, as well as those of South America, Mexico and Japan. The government is also in the market for metals, and the Superintendent of the Mint, Gov. Pollock, advertises for nickel, copper and zinc, to be used in coinage. The output of coin has been very large lately, nearly a million dollars in twenty dollar gold pieces alone having been turned out in one day last week, beside large amounts of silver coined for the Treasury and private individuals.

AN IMPROVED FIRE TELEGRAPH.

A Committee of Councils has been engaged for some time in investigating a better system of fire alarm telegraph, that at present in use being faulty in many respects, and unsuited to the necessities of the city. After deliberation, the new system of Gamewell & Co., now in use in various cities in the interior of this and New York State, and which has been said to give general satisfaction, has been adopted. The wires will also be extended over a wider area, and give greater security against incendiary fires, which are to be expected at this time.

ROLLING MILL ITEMS.

There is little of special interest in mill news. The Western Bar Association, at the meeting on Tuesday, reduced iron to 3 3-10 cents card rate, which has, however, been selling at 3 cents for some time, and has been offered here at 2 8-10 cents per pound. Wages were also reduced 12½ per cent. to puddlers and heaters, including all skilled labor, and 10 per cent. to ordinary labor, the sliding scale men included. The mills will, it is said, be kept at work for the present.

THE COAL TRADE.

The anthracite trade continues active, with an increased production of 787,000 tons for 1873. Vessels are scarce and freights active, cargoes awaiting all available vessels. Two more steam iron colliers for the Reading Co. will be launched in January from Cramp's yard, and the company's own yard at Richmond is expected to be building iron colliers by July, when transportation will be easier.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From our Regular Correspondent.*)

SHEFFIELD, Eng., October 14, 1873.

The first of the Staffordshire quarterly meetings was held at Wolverhampton, on Wednesday last, and was numerously, as well as influentially, attended by merchants and manufacturers from the South Staffordshire and other districts. Owing, however, to the extremely unsettled condition of the wages question, business was not of the most extensive nature. Quotations, both at this meeting and at the one held on the following day at Birmingham, were not officially altered, but there was an obvious, and in some cases declared, upward tendency, which presages the fact that there will be no reduction this year either in pig or finished iron. At the meeting first mentioned all mine pig was quite firm at £7 per ton, and some Shropshire makers, such as the Lilleshall Company, were resolutely asking £7. 10/ and £8. 10/ for cold blast, but so far as I am able to learn they were not successful in disposing of any considerable quantity at that extreme figure. The finished iron makers, too, were almost unanimous in stating that they could not possibly afford any material reduction while pig and fuel remain so abnormally dear. This latter most important requisite seems to grow dearer week by week, and that, too, in the face of the undoubted fact that the iron trade generally is by no means so brisk as it was this day twelvemonths. The Shropshire iron masters, who are generally in force at Wolverhampton on quarter days, asked £14 for fencing rods, and other descriptions—wire, for instance—were held quite rigidly at full rates. The Birmingham meeting also passed over without any alteration in official quotations, mainly, as I have stated, owing to the unsettled state of the wages question. The Shropshire makers of pig were desirous of obtaining an extra 10/, but there was clearly a want of unanimity among the Staffordshire makers, which prevented that consummation, however desirable to themselves in the abstract, from being attained. Certain of them endeavored to follow the Salopian lead by raising hot blast native all-mine from £7. 10/ to £7. 15/, but it became known that many leading makers were doing a moderate shake at £7 to £7. 5/—the old basis—per ton, and the attempt to force the market was abandoned. Pigs of third class and inferior quality were not altered in price, part mine being £6 to £6. 5/, and ordinary cinder £4. 17/6 to £5. The partial rise in pigs gave a fictitious and temporary strength to finished descriptions, but it proved of no permanent value, and in the end prices were generally as low as, and in some few instances lower than, they were a fortnight ago. Common sheets were sold at £14, and better qualities at £15, while some were disposed of at £18 to £19. Lord Dudley's price is still £14. 12/6 for bars, £15. 12/6 for strips and hoops, with other kinds in proportion. Messrs. Barrows quote bars £14; angles, £16; hoops, £17. 10/; sheets and boiler plates, £18 to £19; nail rods are obtainable at £12. 10/; common angle iron at £12. 10/, and strip at £14. 10. These rates are considerably—and when I say considerably I mean 10/ to 30/ per ton—higher than those quoted by the Welsh makers, hence we find that no small quantity of Welsh made bars are being brought to Birmingham and the district for working up in place of the dearer, even if superior, local made iron. Notwithstanding these prices, which are confessedly abnormally high, a considerable number of fairly good specifications were given out at both meetings, and as a result most of the works are far better employed to-day than they have been for some months past. These favors are for engineering work and iron foundry, for chilled rods, horizontal engines, bridge girders, and general constructive iron work, axles, wheels and railway carriages, and for hollow ware of various descriptions. The many minor trades of old "Brum," as the aborigines fondly term Birmingham, are all active, and the flint musket branch has experienced a great pressure since the commencement of our little difficulty with King Coffee and his eminently respectable Ashantee braves. For this and sundry other patent reasons neither Birmingham nor Sheffield are at any time averse to a war. They profit by it in any case, and sometimes manage to supply both sides, as in this instance. The safe makers have been in receipt of an increased number of orders since the meeting, as also have the electro plate, lock, screw and cut nail trades. At Middlesborough, the center of that comparatively new iron district, which now rules to a certain extent even its parent, Staffordshire, the quarterly assemblage was not provocative of any great amount of business, mainly, as in the other case, owing to the wages topic being undisposed of. The returns of the Cleveland Ironmasters' Association show that the total make of iron during September in that district was 167,078 tons from 128 furnaces, being a decrease of 949 tons upon August in this year, but an increase of 6050 tons upon September, 1872. Foreign shipments last month were 24,325 tons, an advanced tonnage by 1431 as compared with last September. Coastwise shipments were 20,000 tons, or 7352 more than September, 1872. Stocks have decreased to 59,963 tons, as against 61,317 in August. The meeting made little difference in the price of iron, No. 1 being £5. 7/6; No. 2, £5. 2/6; No. 3, £4. 17/6; No. 4, £4. 16/; M, £4. 15/6 and W, £4. 15/; Rails, £11. 10/ to £12; angle and bulb, £13 to £13. 10/; boiler plates, £15 to £15. 10/; cable iron, £13 to £13. 10/; nail rods, £12 to £12. 10/; rivet iron, £13 to £13. 5/; ship plates, £13 to £13. 10/; best bars, £13 to £13. 10/; best best, £14. 10/ to £15; common, £12. 10/ to £13; and puddled, £8 to £8. 10/. As to wages, I may say that the ironmasters claim a reduction of 12½ per cent., which they have submitted in due course to the district board of arbitration, which has Mr. Rupert Kettle as arbitrator. You are, doubtless, aware of the manner in which that gentleman's inquiry is conducted, and of the statements by which he is guided to a conclusion, *i. e.*, the average net selling price of rails, plates, bar

and angles during the preceding six months. For this purpose Mr. Waterhouse, a sworn accountant, certifies and verifies the makers' returns—which are sent in, or should be, by all employing members of the board. Mr. Waterhouse certifies, on this occasion, that the average net selling price per ton for the three months ending May 31st was £11. 8/5, and for the three months ending August 31st, £11. 19/3¼, basing this upon the following tabular statement:

Sales from 1st March to 31st May, 1873.

	Weight invoiced.				Percentage of Total Sales.	Average Net Price Per Ton.		
	Tons	cwt	qr	lb		£.	s.	d.
Rails..	95,853	6	2	16	55·53	10	12	7 75
Plates.	43,308	14	1	19	25·22	12	10	2·39
Bars..	20,904	18	0	8	12·18	12	13	2·66
Angles	12,131	15	2	24	7·07	11	11	8·89
	171,698	14	3	11	100·	11	8	4 89

Sales from 1st June to 31st August, 1873.

	Weight invoiced.				Percentage of Total Sales.	Average Net Price Per Ton.		
	Tons.	cwt	qr	lb		£.	s.	d.
Rails..	79,669	1	2	28	56·39	11	8	1·18
Plates.	36,772	16	2	7	26·03	13	15	7·72
Bars..	17,056	8	3	14	12·07	12	12	1 73
Angles	7,790	3	2	19	5·51	12	8	7·79
	141,281	10	3	7	100·	11	19	3·63

Sales from 1st to 30th September, 1873.

	Weight invoiced.				Percentage of Total Sales.	Average Net Price Per Ton		
	Tons.	cwt	qr	lb		£.	s.	d.
Rails..	25,781	2	3	21	53·9	11	0	9·67
Plates.	13,191	8	1	9	27·06	12	8	2·63
Bars..	6,119	15	3	3	12·54	12	4	0·6
Angles	3,655	0	2	3	7·5	11	18	11·19
	48,740	7	2	8	100·	11	12	5·9

The masters, as a matter of course, argue from this that the price of pig iron has been and still is declining, and that the average net selling price was likely to be yet lower. On the other hand, Mr. Kane, on behalf of the operatives, contended that the recent fall of 19/ per ton in pig iron lessened the cost of the manufactured article to that amount, and argued that by the returns of the employers they had suffered no loss during the past half year, and that in March last the average was £11. 8/4 and now £11. 12/6. The latter figure, Mr. Kane contended, was 6/ higher than when the men had the last advance of 7½ per cent. conceded, and, in addition, coals were 4/ per ton cheaper, therefore they ought not to ask for any decrease of wages. The masters in reply to this further substantiated their demand for a reduction, and offered to allow Mr. Kettle to inspect their books, which would prove that the cost of the various raw materials for making iron was higher than at any other time. Neither party appeared willing to make any concession, and after some further discussion the matter was left to Mr. Kettle for decision. That gentleman gave in his award last evening, and I learn by telegraph that he decides that the present wages shall continue without reduction.

There are several minor wages disputes throughout the kingdom. At Burnley (Lancashire) the strike of miners continues. A strike of common scythe makers exists at Sheffield on the question of an advance of 10 per cent., and some remnants of the engineers' strike are yet left. At Manchester the strike of engineers has been settled by arbitration in favor of the men, to the extent that they are awarded an increase of 8d. per week instead of the 2/ they demanded. In some parts of Warwickshire and Leicestershire the miners are moving for a rise, as also in certain parts of North and South Wales. Last week the annual conference of the Amalgamated Association of Miners was held at Bristol, the sittings lasting daily the whole week, at an estimated cost of £120 per diem to the Association. There was a large gathering of delegates from all parts of the country under the presidency of Holliday. The proceedings were not such as to be of very general interest to your readers, but were, I may say, well conducted, and characterized throughout by considerable business ability. The Board of Trade returns, just issued for September, show a marked diminution in iron and steel, the totals for September, 1872, and September this year, being respectively 300,508 and 265,798 tons, a falling off this year of 34,715 tons, or about 13 per cent. in quantity. The values are £3,623,335 and £3,465,586 respectively, a fall of 5 per cent. Of hardware and cutlery the value of £431,295, as against £433,500 in September, 1872. Of the articles showing an increase is machinery, 40 per cent., whilst arms and ammunition have fallen off 34½ per cent., and coal, patent fuel and coke, 6 per cent. The total quantity of coal exported during the month was 1,134,893 tons. These facts are self explanatory, and I shall not, therefore, dwell upon them. If we direct our attention to Scotland, we find that warrants are currently changing hands in the Glasgow market at 115/ to 116/, with a prospect, I opine, of going up without much delay. The reason I found this opinion upon is the fact that stocks in Connall's stores are now but 40,000 tons at the outside, as compared with 400,000 tons three years ago; hence a tremendous run is likely at any moment to set in without there being any large reserve stock to fall back upon. Maker's prices are slightly harder, and, in detail, are: Gartsherrie, No. 1, 125/; No. 3, 117/6; Coltness, No. 1, 127/6; No. 3, 118/6; Summerlee, No. 1, 117/6; No. 3, 115/; Carnbroe, No. 1, 118/6; No. 3, 115/; Monkland, No. 1, 115/; No. 3, 114/; Clyde, No. 1, 115/; No. 3, 114/; Govan, No. 1, 115/; No. 3, 114/; Langloan, No. 1, 122/6; No. 3, 116/; Calder, No. 1, 125/; No. 3, 115/; Glengarnock, No. 1, 118/6; No. 3, 116/; Eglinton, No. 1, 117/; No. 3, 115/; Dalmellington, No. 1, 118/; No. 3, 116/; Carron, No. 1, 120/; Shotts, No. 1, 125/; No. 3, 116/; Kinneil, No. 1, 117/6; No. 3, 114/. Shipments last week were over 11,000 tons, a decrease of about 800 tons as against same week of last year, and the preceding week of this. The malleable iron trade is reported fairly brisk, and a moderate stroke is doing in manufactured iron generally. The Clyde shipbuilding trade is better employed, there being now 80 keels laid down for new vessels; three, for steamers averaging 3000 tons each, were commenced last week. The Liverpool and Texas Company have contracted with M'Millan & Sons, of Dumbarton, for a steamer of 2250 tons; another firm has taken a contract for nine, which will require 25,000 tons of iron for their construction, and a third firm has two of iron sailing vessels, of 2200 tons each, for a Liverpool house. These, when launched, will be the largest iron sailing vessels afloat. The tonnage launched on the Clyde last month was 18,600 (12 vessels), and for the nine months of this year, 184,500 (119 vessels).

Among the vessels launched last month there were the following: For the North German Steam Navigation Company, of Bremen, for the German and Baltimore trade, a steamer of 3066 tons and 500 horse-power, built by Messrs. Steele & Co., Greenock; the Franconia, 2000 tons and 300 horse-power, built by Messrs. Caird & Co., Greenock, for the Hamburg-American Company's Hamburg and West India trade; the Almora and Mecca, respectively 2000 tons and 300 horse-power, and 2500 tons and 250 horse-power, for the British India Steam Navigation Company, of Glasgow, the former built by Messrs. William Denny Brothers, Dumbarton, and the latter by Messrs. A. & J. Inglis, Glasgow; and the Glenartney, 2200 tons and 300 horse-power, built by the London and Glasgow Engineering and Iron Shipbuilding Company, for Messrs. A. C. Gow & Co.'s Clyde and China trade. There were also two iron sailing vessels of large size, and the remainder were steamers varying from 1240 tons down to 400 tons.

I have very little news from South Wales, the iron trade remaining fairly well employed. Dowlais has sent cargoes to New York; Rhymney to Cronstadt, and Ebbw Vale to Ibrail—chiefly of rails. Tin plates are flat at falling prices, I. C. Coke being 29/; I. X. Coke, 35/; I. C. Charcoal, 37/, and I. X. Charcoal, 41/ to 42/ per box of 225 sheets, at the works.

With respect to the trade of Sheffield, I may say that, as a rule, trade is not by any means busier than when my last notes were penned. In a great many instances work has this week been wholly or partially suspended in order to allow of the usual Michælmas stock-taking, manufacturers and managers being in most cases rather glad than otherwise of the cessation of expenses thus caused. As a necessary sequence a considerable number of workmen have had little or nothing to do, except at the largest establishments, which have not, I believe, been totally closed.

It is beginning to be recognized that in order to conduct an iron or steel business with any degree of profit, or so as to be able to compete with home and foriegn makers, the colliery must be looked upon as a perfectly necessary adjunct to the works. The nearer these are together the better, but as this obviously is not practicable in a great many cases, pits must be secured at the nearest possible point. I am led to make these remarks by the statement of a local newspaper that the Oaks Colliery, near Barnsley, has been purchased by two Manchester gentlemen for £240,000, and by the fact, which has come to my own knowledge this week, that one of the principal Sheffield manufacturing firms has just bought a couple of pits in this vicinity at a pretty fair price.

The steel trade must certainly be reported slacker on the whole, there being very few firms who are pressed with orders. It is, I believe, a fact that one or two houses have some old orders on their books, and could get them out of hand if they were so disposed quicker than they are now doing, but are limiting working time in order, if possible, to reduce the price of coke. As a proof that there is considerable confidence in the future of the trade, I may mention that new sheet, &c., mills, have just been put into operation by a leading firm, and another house has greatly extended its producing capabilities by the erection of new melting and converting furnaces. A good tonnage of Bessemer steel continues to be turned out, almost exclusively on old orders, new demands being by no means so heavy as those of last year. Steel rails in fair request, mostly for Russian or home lines for replacements. Crossings of crucible steel, tires, and other railroad accessories, are in demand, but the inquiry for buffers, buffer boxes and plungers, springs, and the like, is anything but brisk, and the same may be said of iron rails.

In the iron trade I do not hear of any marked change, matters being stationary. An opinion prevails that the market will not be any further advanced, although it will certainly not fall.

The cutlery trades have become very dull indeed, and even those houses which are enterprising enough to manufacture machinery are not busy. Despite that, I expect to see most of the cutlery trades look up before Christmas, which is now drawing tolerably near. In the metal trades there has been no great change since I last wrote you. The *Mining Journal* says, of copper, that the market for Chili bars, g.o.b., closed last week at about £84, cash, and opened firm on Monday at the same price. Business was done during the day at £84. 10/, cash, and £85, one month; and 25 tons of Wallaroo was reported as having been sold on Saturday at £93. 10/. English tough copper changed hands at £93. On Tuesday the market maintained its position, and a somewhat larger business was concluded, at about the prices of the previous day. Wallaroo was a shade cheaper, having been sold at £92. 15/, cash, for 100 tons. On Wednesday only a limited business done; 25 tons g.o.b. sold at £80. 13/ net, and 50 at £84, usual cash. Yesterday, toward the close of the day, the market underwent a decided improvement, upward of 1000 tons Chili bars being reported to have changed hands at prices varying from £83. 15/ to £84. 10/, cash, for g.o.b., and £85, one month. Wallaroo, £93. 10/ to £94, cash; Burra, £93. 10/ to £94, two months, and £94. 10/, three months prompt. To-day Chili bars have been sold at £85; English at £93. 10/; four by four sheets are quoted at £100. Yellow metal has been sold at 8¾d., at which price there is some demand. Our market during the past month has been affected adversely by the American panic and the rapid advance in money, and the value of Chili slab was at one time as low as £82, but a rally took place, and £84 is now the lowest price for good ordinary brands. The Board of Trade returns to September 30 show that the exports have exceeded those of last year by over 9000 tons, while imports are less by about 12,000 tons. Public stocks of copper here and afloat, however, only show a reduction of about 7000 tons. Messrs. Rogers & Sons state in their circular that the position from Sept. 1, 1872, to Sept. 1, 1873, was as follows:

	Price.	Stock on hand.	Stock incl'ding afloat and chartered.
1st October, 1872..	£84	29,349 tons	41,409 tons
1st November " ..	86	28,940 "	40,051 "
1st December " ..	85	30,753 "	40,453 "
1st January, 1873..	90	32,001 "	41,991 "
1st February " ..	87	32,432 "	42,012 "
1st March " ..	85	33,180 "	41,663 "
1st April " ..	92	30,396 "	39,375 "
1st May " ..	88	29,908 "	39,094 "
1st June " ..	84	30,912 "	38,984 "
1st July " ..	80	30,634 "	39,856 "
1st August " ..	81	31,607 "	39,279 "
1st September " ..	84	29,938 "	37,371 "
1st October " ..	82	28,637 "	35,405 "

Messrs. James & Shakespeare report that there is nothing doing in furnace material; that Lota is scarce, and that Australian is also scarce and held at high figures.

Tin is dull and prices have weakened. During last week the transactions were 88 tons, 121/ to 122/, cash terms, and 115 tons from 119/ to 120/ per cwt., November and December delivery. At the ticketing on Tuesday, 477 tons Australian ore and 49¼ tons Peruvian Barilla sold as follows: Ore, 27 tons inferior to common, £22¼ to £25 per ton; 99 tons medium quality, £30 to £55 per ton; 421 tons good to fine, £57½ to £76 per ton; Barilla, 7¼ tons medium quality, £54½ per ton; 32¼ tons good and fine, £62½ to £65½ per ton. For the sale on 21st inst., 239 tons Australian ore and 14 tons Peruvian have been declared. English ingots are quoted at £120; 10 tons Straits sold at from £122 to £123; 5 tons Billiton sold at £122. Friday, the market was very unsettled, and prices varied considerably; 5 tons Straits sold at £121. 10/, 5 tons at £122, and 5 tons at £123. 10/. English Ingots quoted at £125. Saturday, 20 tons Straits sold at £121. Monday, the market was firmer; 5 tons Straits sold at £122. Tuesday, it receded again; 5 tons sold at £122, and 8 tons at £121; 50 tons sold at £120 for November and December. English ingots were quoted at £124; 474 tons of Australian ore sold at prices varying from £2. 10/ for very inferior to £76 for fine, being an average of 30/ to 40/ less than last sales. Wednesday, 15 tons Straits sold at £121; 15 tons Straits sold at £120 for November and December, and 10 tons at £119 for December. Lead is dull, but firm, at recent rates.

GLASS CUTTERS.

Our Glass Cutters are made with a handle like a Glaziers' Diamond, but instead of the diamond point they have a small hardened steel revolving wheel, the sharp edge of which cuts nearly as well as a diamond. They are durable and will give entire satisfaction.

Most Hardware Dealers keep them, or will send to us for them if wanted. Where they are not for sale, we will send one by mail, prepaid, on receipt of thirty-five cents. We will send one to any publisher who will insert this notice and forward us a copy prepaid.

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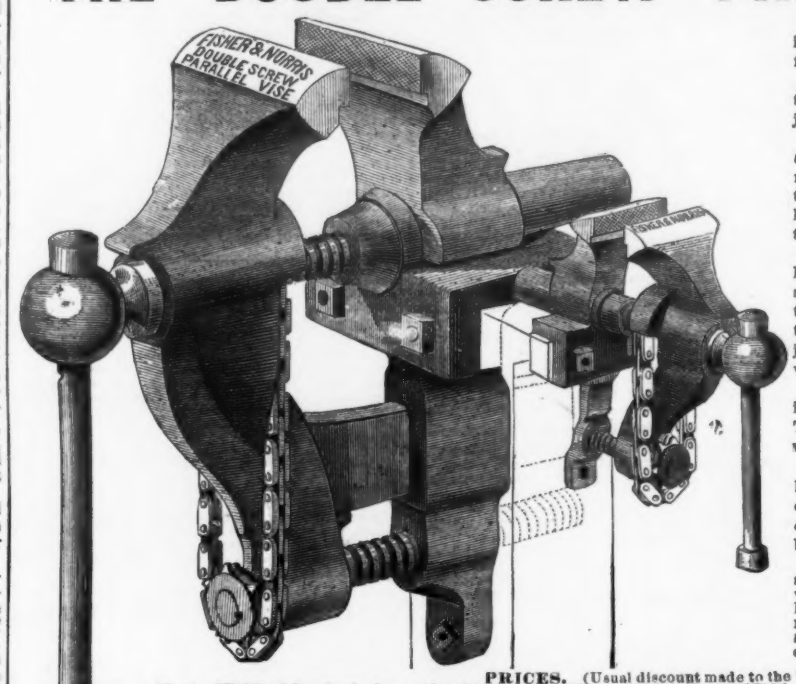
Also Manufacture Barber's Bit Braces, Parallel Vises & Drilling Machines.

THE DOUBLE SCREW PARALLEL VISE.



More than twenty-five years' use of this Vise by Machinists, Tool Makers, Locomotive Shops, &c., has established its superiority over every other.

It is the only one which has all the strength and "grip" of the ordinary English Vise; and at the same time with the jaws *parallel* at every point of opening.

In all other "Parallel" Vises using only one screw, *less than one-third* of the power applied is effective on the work itself; beside, in those vises the large waste of power on the slide from *friction* and the *tendency to "jam,"* of the lower end of the jaw, if screwed up very hard, renders them unfit for heavy work.

In this vise the jaws are kept *always parallel* by the lower screw moving in or out exactly with the upper, lever screw, by means of the chain connecting both: also, by their relative position *two-thirds* of the power applied at the lever screw is received by any piece held between the jaws—thus enabling the heaviest work ever required of a vise to be done with this.

The Screws are forged of the best refined iron, and work in *solid cut thread* boxes. The Jaws are faced with *best* Tool Steel, welded on, file cut, and properly tempered for wear.

The Chain is very carefully made of case hardened inside links and rivets, and, acting only to *regulate* the position of the lower screw for different points of opening, has *no direct strain* of the work upon it; it is therefore as durable as the other parts.

Only the strongest material is used in this manufacture and from actual experiment on the six inch jaw vise which has screws of 1⅜ inch diameter and lever 19 inches long, it has been found that applied at the lever Screw, it required to break either of the jaws, *eleven and one-half tons*, thus exhibiting a maximum strength far above *any* other vise of like size.

PRICES. (Usual discount made to the Trade.)

No. 1. Width of Jaw 3 inches, and weighing about 12 lbs., $6·00 | No. 3. Width of Jaw 5 inches, and weighing about 80 lbs., $18·00
No. 2. Width of Jaw 4½ inches, and weighing about 50 lbs., 14·00 | No. 4. Width of Jaw 6 inches, and weighing about 125 lbs., 24·00
No. 5. Width of Jaw 7 inches, and weighing about 160 lbs., $30 00.

THESE GOODS ARE SOLD BY OUR AGENTS IN

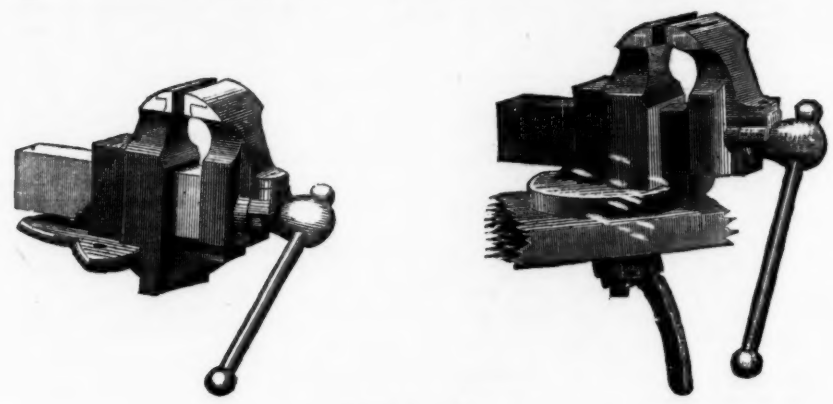
NEW YORK.—Messrs. Clark, Wilson & Co. Russell & Erwin Manufacturing Company. Messrs. Durrie & Rusher.
BOSTON.—Messrs. George H. Gray & Danforth. PHILADELPHIA.—Messrs. James C. Hand & Co. BALTIMORE.—Mr. W. H Cole.

FISHER & NORRIS, Trenton, N. J.,

Sole Manufacturers of these Vises, and of the "Eagle" Anvils.

HOWARD

PARALLEL BENCH VISE.



Manufactured at the

HOWARD IRON WORKS,

Buffalo, N. Y.

RUSSELL & ERWIN MANUFACTURING CO.,

New York and Philadelphia, Agents.

MINOT & CO., Oliver Street, Boston,

Selling Agents Lowell Wrench Co.'s

TRIPLE ACTING RATCHET DRILL, the Simplest, Cheapest and Best.

MANUFACTURERS OF

HAMMERS,
Sledges,
BLACKSMITHS'
AND
Stone Masons'
TOOLS,
Bush Hammers,
etc., etc.

AGENTS FOR

Washoe Picks,
Western Files,
Sweet's Crow Bars,
N. Carolina Handles,
Steel Foundry Riddles
Beaver Falls Cutlery
etc., etc.

Send for Price Lists and Discounts.

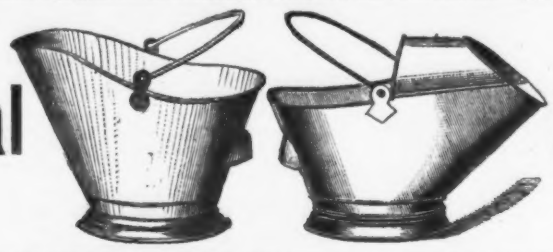
WM. RESOR & CO., Cincinnati.

VIENNA UNIVERSAL EXPOSITION

MEDAL OF MERIT AWARDED TO MONITOR

THE BEST COAL COOKING STOVE IN THE WORLD.

ELEVEN ENTIRELY NEW SIZES.

Coal  Hods.

STAMPED CORRUGATED RIVETED BOTTOM IN SIX STYLES.

SMITH, BURNS & CO.,

Manufacturers of

Galvanized and Japanned Sheet Iron Goods and Tin Ware, Fry Pans, Broilers, Ash Cans, Garbage Buckets, Chamber Pails, Tea Kettles, Wash Boilers, Water Pails, Well Buckets, Toilet Ware, &c., &c. Exclusive manufacturers of the Patent Combined Chamber and Commode Pail. Stamped and Planished Ware.

Warehouse, 46 Cliff Street, between Beekman and Fulton Streets, NEW YORK.

A HOME COMFORT.

Brooks' Patent Stove Board.

Letters Patent from the United States and Canada.

This really genuine improvement in Stove Boards is illustrated by the cuts; the round one being a top view of the zinc surface, polished and neatly beaded around the edge, and the oblong one shows the under finish of paper, and between that and the zinc a layer of sheet iron, which effectually protects it from being marred by the stove legs, or otherwise; and also stiffens it to lay very flat, and is a necessity to support the ornamentation.

The parts are held together by turning the edge of the zinc like a hem around the under side. They are equally desirable for Parlor or Cooking Stoves, are very compact to ship, are as cheap as plain zinc, when their durability is considered, and are the most appropriate article in market for their purpose.

21 Sizes, Round, Square and Oblong. Prices and Circulars supplied upon application. Address the manufacturers,

SIDNEY SHEPARD & CO., Buffalo, N. Y.

AGENTS.—VAN WART & McCOY, 43 Chambers Street, N. Y.; SHEPHERD & LLOYD, 405 Commerce et, Philadelphia. Sold by PERRY & CO., 86 Beekman, St., N. Y.

TO ALL WHO USE STEAM-POWER!

We will put our Governor on any Engine, and guarantee it to prove itself superior to all others.

If, after a fair trial, it does not, we will take it off at our own expense.

Shive Governor Co

BETHLEHEM, PA.

ALSO,

SHIVE'S PATENT WATCHMAN'S CLOCK AND DETECTOR.

The Best and Cheapest Watcher of the Watchman made.

PRICE ONLY $15.

Circulars sent free.

WILSON MANUFACTURING COMPANY.,

NEW LONDON, CONN.

MANUFACTURERS OF

SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp Heads and Screws, Parallel Bench Vises, Sash Pullies, Hog House Pullies, Composition Cocks, Bench Screws, Vise Screws Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,

Warehouse 37 Chambers St., N. Y.

PYROMETERS

for BLAST FURNACES.

E. BROWN'S STANDARD PORTABLE,
E. Brown's Improved
Gauntlet

Edw. BROWN,

311 Walnut St., Philadelphia.

ALSO FOR SALE

PYROMETERS

For Baker's Ovens, Boiler Flues, Galvanizing Baths, Oil Stills, Vulcanizers, Superheated Steam.

E. Brown's Portable Blast Gauge for the plug hole, Steam Gauges, Blast Gauges, Mercury Gauges, Recording Steam Gauges, Engine Counters, Indicators for ascertaining the Horse Power.

Over 200 Gauntlets and 60 Portable Pyrometers are now in use at Blast Furnaces.

Circulars on application.

AMERICAN

MEAT AND VEGETABLE

CHOPPER,

Sold by all Hardware Dealers.

D. A. NEWTON & CO.,

General Agents,

106 Chambers Street, New York.

PATENT FLOOR & DOOR CLAMP,
Patent Hose Shield,

and 8 Sizes Ratchets.

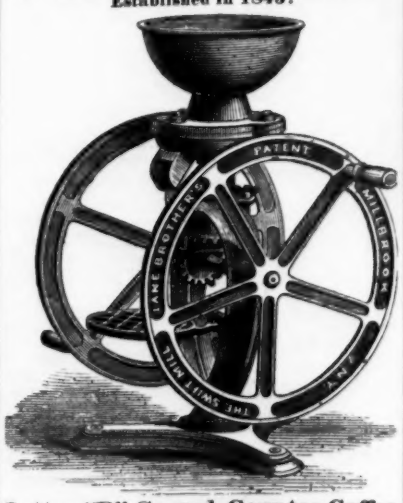
J. A. HAASE, rear 116 Vanhorn St. (East of 1073 Germantown Ave.,) Philadelphia, Pa.

Send for Circular.

HAASE'S Patents.

The Swift Mill.

Established in 1845.



Letter "B" Geared Counter Coffee or Spice Mill.

Stands nearly 2¼ feet high. Is highly finished, colors deep Vermilion and Gold. We make more than 20 different styles and sizes.

Send for catalogue. Manufactured exclusively by

LANE BROTHERS, Millbrook, N. Y.

TORREY'S PATENT

WEATHER

STRIPS.

An Agent wanted in every town in the United States.

Send for Circular

E. S. & J. TORREY,

164 & 166 Fulton Street, N. Y.

J. D. FARRINGTON, Jr.,

38 Murray Street, New York,

MANUFACTURER OF

Japanned, Plain and Stamped Tin Ware,

TOILET WARE a specialty,

Manufactured of IXX Tin and Ornamented in Varied and Elegant Designs.

SOLE MANUFACTURER OF THE PATENT

Self-Righting Cuspadore,

With Cast Iron Bottom, and

FOOTE'S PATENT LOCK UMBRELLA STAND.

THE CORRUGATED STOVE PIPE ELBOW,

Strong, Cheap.

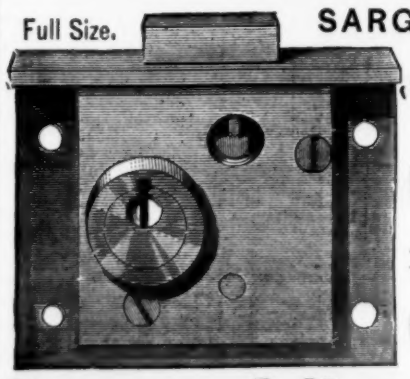
Durable, No Soot, Better Draft.

MANUFACTURED BY

SELLEW ELBOW CO.,

48 Cliff Street, NEW YORK. 27 North Canal Street. CHICAGO.

Full Size.



SARGENT & GREENLEAF'S

Celebrated

UNPICKABLE LOCKS.

Drawer, Trunk,

HOUSE AND STORE DOOR LOCKS

PAD LOCKS,

Night Latches, Etc.,

WITH FLAT GERMAN SILVER KEYS.

Combination Bank and Safe Locks.

Also the

Patent Adjustable Elbow.

For Stove, Furnace, Conductor, and all other Sheet Metal Pipes, With Universal Adjustable Joints.

Can be changed at will to any desired angle. Its advantages over all other Elbows are at once apparent.

For Beauty, Strength and Durability it is Unequaled.

Manufactured by

Sargent, Greenleaf & Cole,

P. O. Box 4598. 300 Broadway, N. Y.

Send for Catalogue and Price Lists.

New York Wholesale Prices, October 29, 1873.

HARDWARE.

Anvils.
Solid Cast Steel.....₱ ℔ 14c
Wright's.....₱ ℔ gold 12c; over 250 ℔s 12½c, gold
" " .....gold 12c
Arm'tage's Mouse Hole.....₱ ℔ gold 11½c
Wilkinson's.....₱ ℔ gold 11½c
Eagle Anvil Co.....₱ ℔ 12c.....dis 15 @ 15&5 %

Apple Parers.
Turn Table.....
Lightning.....} $8·50 ₱ doz
Conqueror.....
Reading.....₱ doz 9 00
Union.....15 00 } dis
Bay State, Paring, Coring and Slicing.....9 00 } 5 %
Skeleton " " " 9 00
Climax Slicer.....$11 00 @ 11 50
Bay State Peach Parer.....11 00 @ 11 50
Lightning " " 7 00
Peach stoner and Halver.....

Augers and Bits.
Snell Mfg. Co.....dis 10 %
Russell Jennings.....dis 30 %
Douglass Mfg. Co., Extra.....dis 30&5 %
" " No. 1.....dis 25 %
" " Hollow Augers.....dis 30 %
Cushman's Expanding Hollow Augers.....1 50 each, net
" " Bits.....dis 30 %
Ives' " Hollow Augers.....dis 30 %
" " Expansive Augers.....dis 25 %
" " Bits.....dis 30 %
Andrews' Bits.....dis 30&10 %
Cook's Patent Augers.....dis 25&10 @ 30&10 %
" " Bits.....dis 20 %
Shepardson's Double Cut Bits.....dis 20 %
Griswold's Patent.....dis 30&10 %
Cast Steel Cut Augers.....dis 30&10 %
" Auger Bits.....new list dis 30 %
Long Augers.....$48 per doz—dis 25 %
Bonney's Patent Hollow.....$48 per doz—dis 30 %
Stearns' " .....dis 20 %
Morse's Bit Stock Drills.....

Axes.
Blood's.....$12 50 @ 14 00
Hunt's.....₱ doz $15 00 @ 17 50 net @ dis 5 %
Collins'.....₱ doz 12 00 @ 16 00 net @ dis 5 %
Hard's.....₱ doz 12 50 @ 13 50
Schweitzer Mfg. Co.'s.....₱ doz 13 00 @ 15 00
Simmons'.....₱ doz 12 00 @ 12 50
Morris'.....₱ doz 12 00 @ 13 50
Red Jacket.....₱ doz 12 50 @ 12 50
Man'n's.....₱ doz 12 50 @ 13 00
" Double Bitted.....₱ doz 21 50 @ 22 00
Powell Tool Co., "Peerless".....₱ doz 18 00 @ 14 50
Underhill's.....₱ doz 12 50 @ 13 50
" " Crown.....₱ doz 13 00 @ 14 00
John Leverett's.....₱ doz 12 50 @ 15 50

Balances.
Chatillon's.....
Fairy's.....} new list dis 15 %
Morton's.....

Bands.
Plated.....add 10; dis 5 %
Iron.....dis 15&5 %
Brass (Plated list).....dis 5 %
Swedge.....add 15; dis 5 %

Bells.
Hand, Light Brass.....dis 45&10 %
White Metal.....dis 20 %
Globe.....dis 10 %
Swiss Hand.....dis 10&10 %
Abbe's.....net
Taylor's Patent Door.....net
Western Gong.....net list
Brook's Crank.....dis 15 %
" Pull.....gold 12c
Hart Mfg. Co., Crank and Pull.....new list dis 50 %
Cow—Common Wrought.....new list dis 33⅓ %
Western.....new list dis 33⅓ %
Kentucky "Star".....new list dis 25 %
Dodge's Genuine Kentucky.....dis 20 %
Yaw's Genuine.....

Bellows.
Blacksmiths'.....dis 10 %
Moulders'.....dis 15 %

Blind Fasteners.
Van Sand's.....₱ gross $14 00
Washburn's Patent.....₱ gross 14 00
Merriman's.....add 35 @ 40 %

Blind Staples.
Boardman's Patent, ¾ in. and larger.....₱ ℔ 31½c
" " ⅝ in. " " .....42 c

Bolts.
Carriage and Tire, Ætna Nut Co.....dis 60 %
Stove, Ætna Nut Co.....dis 10&5 %
Cast Iron Barrel, Shutter, &c.....old list dis 50&10 %
Wrought Iron Barrel.....net
" " Square.....dis 10&10 %
Carriage and Tire, Common.....dis 70&10 %
" " Norway Iron.....dis 40 %
Star, Philadelphia.....dis 50 @ 50&10 %
Eagle, Philadelphia.....dis 50 @ 50&10 %
Philadelphia Pattern, P. S. & W.....dis 50&10 %
Carriage and Tire, R. B. & W.....old list dis 50&5 %
Plow, R. B. & W.....dis 30 %
Stove, R. B. & W.....dis 10 %
" Shelton Co. Shaved Heads.....dis 10 %
Union Nut Co., old list.....dis 50&15 %
Machine.....dis 25 @ 30 %
Borax—Per case of 100 lbs.....₱ ℔ 22c

Boring Machines.
Kellogg's.....dis 10 @ 15 %
Snell Mfg. Co., Rice's Patent.....dis 15 %
" " Regular.....dis 15 %
Douglas Mfg. Co.....dis 20 %
Hovey's Angle.....$6 00 @ 6 25
" Upright.....4 25 @ 4 50
Mortising Machines each.....$18 00
Bow Pins......dis 45 @ 50 %

Braces.
Barber's Patent.....dis 40 %
Wilson Mfg. Co.....net @ add 5 %
Spofford's Patent.....dis 40 %
Noble's Patent.....dis 33⅓ %
Bartholomew's American Ball.....dis 10&10 %
" Patent Grip.....dis 40 %
Q. S. Backus & Co.....dis 30&10 %

Bung Hole Borers.
Common and Ring.....dis 20 %
Enterprise Mfg. Co.....dis 20&5 %
Ives' Tap Borers.....dis 20 %

Butchers' Cleavers.
Bradley's.....dis 15 %
Beatty's.....new list dis 10 %

2	4	5	6	7	8	9
$19·00	$21·50	$24·00	$27·00	$30·00	$33·50	$36·50	$40·00

Hart Mfg. Co.....dis 45&10 %

0	1	2	3	4	5	6
$25·25	$29·75	$30·25	$33·75	$43·55	$43·50	$54·00

Butts.
Wrought Brass.....new list dis 20 %
Cast Fast Joint, Narrow.....dis 40 %
" " Broad.....dis 40 %
Cast Loose Joint.....dis 50 %
" " Mayer.....dis 40 %
" " Parliament.....dis 40 %
Loose Pin.....dis 40&10 %
Wrought Fast Joint, Narrow.....dis 30 @ 20&5 %
Wrought Broad.....dis 35 %
" Loose Joint.....dis 35 %
Wrought Table and Back Flaps.....dis 25 @ 35&5 %
Cast Butts, Ohio Butt Co.—
Narrow Fast, Drilled and Wire Jointed (old list).....dis 35 %
Broad Fast, Drilled and Wire Jointed.....dis 35 %
Broad, Loose, Drilled and Wire Jointed.....dis 45 %
Silver Tipped.....dis 45 %
Loose Joint, Japanned.....dis 25 %
Loose Joint, Acorn and Silver Tipped.....dis 40 %
Loose Joint, Acorn and Silver Tipped.....dis 30&10 %
Palmer Blind Butts.....dis 40&10 %
Nicholson Blind Butts.....dis 40&10 %
Parker's Blind Butts.....dis 40&10 %
A. E. Parker's.....dis 40&10 %
Clark's Surface Blind Hinges, Nos. 1, 3 and 5.....dis 40&10 %
" " " " No. 20.....dis 50&5 %
" " Mortise " " .....dis 40&10 %
Seymour's.....dis 40&10 %
Shepard's.....dis 40&10 %
Garretson's.....dis 40&10 %
Standard.....
Union Mfg. Co.—
Drilled and Wired Cast Fast.....dis 35 %
" " " " Loose.....dis 45 %
Loose Joint Japanned or Silvered Acorn.....dis 40 %
" " Figured Enameled.....dis 30 %
" " Nickel Capped.....dis 30 %
" " Solid Bronze.....dis 10 %

Caps—Percussion, per 1000.....40c

G. D.	
Eley's E. B.	1-4s, 60c.; 1-10s, 67½c., gold
" Double Waterproof,	1-4s, $1·50; 1-10s, $1·57½c., gold
" Colt's	1-4s, 74½c.; 1-10s, 82½c., gold

Cartridges.
Metallic.....dis 30 %

Cards.
Horse and Curry.....dis 25&10 %
Cotton.....new list dis 10&10 %
Wool.....new list dis 10&10 %

Casters.
Iron and Wood Wheel Plate.....new list dis 20&10 %
Brass Wheel Plate.....new list dis 20&10 %
Patent Wheel Plate.....new list dis 20&10 %

Chain

English Coil	13½	10	9¼	8¾c	8¼	8¼c
₱ ℔	3-16	¼	5-16	⅜	7-16	½

Trace, 6½-10-2.....₱ pair, gold, 62c
Trace, 7-10-2.....₱ pair, gold, 67c
Galvanized Pump Chain.....₱ ℔ 14c
German Halter Chain.....new list, gold, dis 25 %
German Coil.....new list, gold, dis 25 %
Jack Chain, Iron.....dis 35 @ 40 %
" Brass.....dis 20 @ 25 %

Chalk.
White.....₱ gross, 60c
Red.....₱ gross, 80c
Blue.....₱ gross, 90c
Orayons.....₱ gross, 14c

Cherry Stoners.
"Family".....₱ doz $9·00

Chisels.
Socket Firmers.....dis 60&5 @ 60&10 %
Socket Framing.....dis 60&10 %
Socket Corner.....dis 60&10
Tanged Firmers.....dis 40 to 40&10 %
Butcher's.....$5·50 to £ gold—new list
Sandford's.....$5·50 to £ gold
Newbold's.....$5·50 to £ gold—new list
Spear & Jackson's.....$5·50 to £ gold—new list

Clips, Axle.
Norway or Best.....dis 50 @ 50 %
Superior.....dis 40&5 %
"Star," Superior, Philadelphia.....dis 45&5 %

Coal Shovels.
Iron Handled.....₱ doz, $ 55 @ 1 25
Wooden Handled.....₱ doz, 1 00 @ 2 00

Coal Hods.
Smith, Burns & Co.....dis 25 %

	No. 14	15	16	17	18	
Japanned	$12·00	12·75	13·50	15·50	18·00	per doz
Galvanized	15·00	16·00	17·00	19·50	22·50	"

	No. 14	15	16	17	18	
Common Japanned	$9·00	9·75	10·50	12·00	13·50	per doz
" Galvanized	13·00	14·50	15·50	17·50	19·50	"

Common Japanned.....dis 40&10 %
" Galvanized.....dis 40&10 %

Cocks.
Brass Racking.....dis 20&10 %
Lock and Globe.....dis 20&10 %

Coffee Mills.
Board and Box.....dis 15 %
Increase Wilson's.....new list dis 10 %
Selsor's Pat.....$9·50, $10·50—dis 20 %
French Steel.....dis 10 @ 20 %
"Champion".....dis 20 %
Swift's.....dis 20 %

Compasses and Dividers.
Bemis.....dis 15&15 @ 20&5&15 %
Excelsior.....dis 30 %
Peck Stow & Wilcox.....dis 25 %

Coopers' Tools.
Bradley's.....dis 15 @ 20 %
Chas. E. Little.....dis 15 @ 20 %

Corn Knives and Cutters.
Bradley's.....list net

Crucibles.
Gautier & Co.....₱ No. 5½c

Curry Combs.
Hotchkiss' and Kellogg's, Iron and Brass.....dis 15 %
Fitch's.....dis 15&10 %
Ruggles'.....dis 15 @ 20 %
Rubber.....₱ doz, $9·00—dis 10 %
Schweitzer Mfg. Co.....dis 20 %

Curtain Pins.
Silvered Glass.....dis 40&10 %

Cutlery.
American Table.....
American Pocket.....dis 15 %

Door Springs.
Gray's.....$7·50 per doz—dis 40&10 %
Torrey's Patent.....$7·50 ₱ doz—dis 40 @ 40&10 %
Comer's Japanned No. 6.....₱ doz $5·00
" Coppered " .....6·00
" Silvered " .....8·00
Challenge.—
Japanned.....₱ doz $4 00 @ 6 00
Bronzed.....₱ doz 5 00 @ 7 00
Nickel Plated.....₱ doz 6 50 @ 9 00
1 Gross lots.....dis 10 %
5 Gross lots.....dis 20 %

Drawing Knives.
Bradley's.....dis 60 @ 60&10 %
.....dis 25 %

Drills.
Ingersoll's Ratchet.....dis 25 %
Moore's Triple Acting Ratchet.....dis 20 %

Egg Beaters.
Monroe's.....₱ doz net $3·25 @ 8·50
Ashby's.....₱ doz net 2·25 @ 3·00
Earle's Patent.....₱ doz net 5·50 @ 6·00
Pratt's Aerating.....
Dover.....₱ doz net $6·00

Emery.
Genuine Chester—Regular Nos.....₱ ℔ 8c } dis 5 @ 10 %
" Flour and FF.....₱ ℔ 5c }
Washington Mills—Regular Nos.....₱ ℔ 8c
" Flour.....₱ ℔ 5c

Enameled and Tinned Ware.
Kettles.....dis 15 %
Sauce Pans, Glue Pots, &c.....dis 10 %

Faucets.
Cork Lined, Wood.....dis 60 %
Fenn's.....dis 50 %
" Cork Stops.....dis 40 %
Star.....dis 55&10 %
Frary's Patent Petroleum.....dis 10&10 %
Taylor's Pattern " .....dis 20&10 %
Wood and Metallic.....dis 40 %

Files.
Nicholson.....$5 00 to £ currency
Newbould's.....5 50 to £ gold
J. & Riley Carr's.....5 50 to £ gold
" Rasps.....4 75 to £ gold
Stubs'.....5 50 to £ gold
Butcher's.....5 50 to £ gold
Spear & Jackson's.....5 50 to £ gold
Hargreaves, Smith & Co.'s.....5 00 to £ gold
Jowitt's.....5 25 to £ gold
"Western".....5 00 to £ net
W. & C. Peace's "Imperial".....5 25 to £ gold
R. Ibbotson's.....5 00 to £ gold
Beam & Murray, "Cyclops".....4 85 to £ gold
Fisher's.....4 75 to £ gold
Goodlad's.....4 00 to £ gold
Moss & Gamble.....5 25 @ 5 50 to £ gold

Fluting Machines.
Acme.....$7 00 each net
Cole.....5 75 each net
Manville, No. 2.....7 00 each net
Knox, with 4-inch Rolls.....5 00 each net
" " 6 " .....6 00 each net
O. K.....6 50 each net
Peerless, 4-inch Rolls.....4 00 each net
" 5 " .....5 00 each net
Excelsior, No. 1.....4 75 each net
" No. 2.....6 50 each net
Diamond.....7 50 each net
Climax 7-inch Rolls.....8 00 each net
" 4½ " .....6 50 each net
Empire.....4 00 each net
Eureka, No. 1, 7-inch Roll.....8 00 each net
" No. 2, 5-inch Roll.....6 00 each net
K. F. M., 4-inch Roll.....5 50 each net
" 6-inch Roll.....6 00 each net
Myers' Fashion Fluter, 4½-inch Rolls.....3 00 each net
Convex Brass Fluter, Sad Iron attachment.....$1·75
Domestic Fluter.....$1·75 each net
Fairy, Self-Heater.....10 00 each net
National, 5-inch Rolls.....5 00 each net
Ponton Fluter, Bright.....$1 50—dis 25 %
" Galvanized.....2 00—dis 25 %
Geneva Hand Fluter.....$1 25 each net

Fry Pans.
Tinned.....dis 20 %

₱ doz	$3·00	3·25	3·62	4·00	4·20	5·00	5·20	6·00	7·50
No.	0	1	2	3	4	5	6	7	8

Peck, Stow & Wilcox.....dis 25 %
Smith, Burns & Co., "Excelsior" Polished.....dis 20 %

₱ doz	$3·70	4·00	4·20	5·80	6·00	7·00	8·00	9·00
No.	1	2	3	5	6	7	8	

Hammers.
Emmet Hammer Co.....dis 10 %
Maydole's.....new list net
Cheney's.....new list net
Verree.....dis 5 %
Yerks & Plumb.....new advanced list dis 5 @ 10 %
Minot & Co.....dis 15 %

Handles.
Hammer and Hatchet.....dis 10 %
Quakertown, Axe, Pick and Sledge.....dis 10 %
" Hammer and Hatchet.....net
Greensboro', Axe, Pick, Hammer, &c.....dis 10 %
Woolworth, Axe, Pick and Sledge.....dis 10 %

Harness Snaps.
Judd's.....dis 30 %
Fitch's.....dis 50 %

Hatchets.
Isaiah Blood.....dis 10 %
Shingling, Nos. 1 2 3.....₱ doz $7 50 8 00 8 50
Claw, " 1 2 3.....₱ doz 8 50 9 00 9 50
Claw, " 1 2 3.....₱ doz 7 50 8 00 8 50
Hunt's.....net
Shingling, Nos. 1 2 3.....₱ doz $7 25 8 00 8 75
Claw, " 1 2 3.....₱ doz 7 75 8 50 9 25
Lathing, " 1 2 3.....₱ doz 7 50 8 25 9 00
Hurd's.....dis 20 %
Shingling, Nos. 1 2 3.....₱ doz $8 00 8 50 9 00
Claw, " 1 2 3.....₱ doz 9 00 9 50 10 00
Lathing, " 1 2 3.....₱ doz 8 00 8 50 9 00
Newark's Edge Tool Co.'s.....dis 25 %
Shingling, Nos. 1 2 3.....₱ doz $6 50 7 00 7 50
Claw, " 1 2 3.....₱ doz 7 25 7 75 8 25
Lathing, " 1 2 3.....₱ doz 6 50 7 00 7 50
Yerks & Plumb.....dis 10 %
Shingling, Nos. 1 2 3.....₱ doz $7 00 7 50 8 00
Claw, " 1 2 3.....₱ doz 7 50 8 00 8 50
Lathing, " 1 2 3.....₱ doz 7 00 7 50 8 00
Simmon's.....dis 10 @ 15 %
Shingling, Nos. 0 1 2 3.....₱ doz $7 50 8 00 8 50 9 00
Claw, " 1 2 3.....₱ doz 9 00 9 50 10 00
Lathing, " 1 2 3.....₱ doz 8 00 8 50 9 00
Broad, " 1 2 3.....₱ doz 9 00 10 00 12 00
" " 4 5 6.....₱ doz 14 00 16 00 18 00
" " 7 8.....₱ doz 20 00 22 00
Elephant.....dis 20 %
Shingling, Nos. 1 2 3.....₱ doz $8 00 8 50 9 00
Claw, " 1 2 3.....₱ doz 9 00 9 50 10 00
Lathing, " 1 2 3.....₱ doz 8 00 8 50 9 00
J. P. Verree & Co.....dis 5 %
Shingling, Nos. 1 2 3.....₱ doz $7 00 7 50 8 00
Claw, " 1 2 3.....₱ doz 7 50 8 00 8 50
Lathing, " 1 2 3.....₱ doz 7 00 7 50 8 00
Underhill's.....dis 10 %
Shingling, Nos. 1 2 3.....₱ doz 7 25 8 00 8 75
Claw, " 1 2 3.....₱ doz 7 75 8 50 9 25
Lathing, " 1 2 .....₱ doz 11 00 12 00

Hinges.
Wrought Strap and T.....dis 30&7½ %
Providence Plate.....{ 6 and 8 in. list 11c. / over 8 in. list 9½c. } dis 10&5 %
Screw Hook and Strap.....{ 8, 10, 12 in. 8¼c / 14 to 36 in. 7¾c } net

Hoes.
Solid Shank, C. S.....₱ doz $8 00—dis 20 @ 25 %
Socket.....₱ doz 9 00—dis 20 @ 25 %
Riveted Eye.....₱ doz 5 00—dis 20 @ 25 %
Grub.....dis 20 %
Planters'—Winsted.....add 10 %
Scovill.....add 33⅓ %
Scovill Pattern (Winsted).....add 30 %

Hooks.
Belt.....dis 50 %
Bench.....₱ doz net $5 00 @ 8 50
Wardrobe, Japanned.....new list dis 10&10 %
Hat and Coat " .....new list dis 15&10 %
Wrought Staples and Hooks and Staples.....dis 60 %
Wrought Hasps and Staples and Hasps, Hooks and Wrought Staples.....dis 60 %
Screw Hooks and Eyes, revised list.....dis 65&10 %

Horse Nails.
Putnam's.....

No.	5	6	7	8	9	10
	32c	28c	26c	25c	24c	23c

In lots 2000 lbs. dis. 5 %.
Ausable

No.	5	6	7	8	9	10
	30c	7c	25c	24c	23c	22c

In lots of 1000 lbs. 5 % discount.
Brundage.

No.	5	6	7	8	9	10
	29c	26c	24c	23c	22c	21c

In lots of 500 lbs., dis. 5 %.
American Pressed.

No.	5	6	7	8	9	10
	22c	20c	20c	20c	20c	20c

In lots of 1000 lbs. dis 5 %.
Perkins Finished (ready to drive).

No.	5	6	7	8	9	10
	31c	28c	26c	25c	24c	23c

In lots of 1000 lbs. dis 5 %.
Buffalo Forged.

No.	6	7	8	9	10
	28c	26c	25c	24c	23c

Globe (Pointed and Polished).

No.	5	6	7	8	9	10
	31c	28c	26c	25c	24c	23c

In lots of 1000 lbs., 5 % discount.
National (Pointed and Polished), Extra Finish.

No.	5	6	7	8	9	10
	30c	27c	25c	24c	23c	22c

In lots of 1000 lbs., dis 5 %.
Vulican (Blued, pointed, ready to drive).

No.	5	6	7	8	9	10
	33c	30c	28c	27c	26c	25c

In lots of 500 lbs., 5 % discount.
" 1000 lbs 7½ % discount.
New London Horse Nails.

No.	6	7	8	9	10
Great Western	27c	25c	24c	23c	22c
U. B.	29c	27c	26c	25c	24c

In lots of 1000 lbs., dis 5 %.
Star Brand.....₱ ℔ 16c
Morgan.....16c

Horse Shoes.
Burden.....₱ keg, $6 37½
Shoenberger.....₱ keg, 6 37½
R. I. Horse Shoe Co., Perkins Pattern.....₱ keg, 6 37½
" " R. I. Pattern.....₱ keg, 6 87½
Mule Shoes.....₱ keg, 7 87½

Kettles.
Enameled.....dis 15 %
Brass.....₱ ℔ 50c
In lots of 500 ℔s.....₱ ℔ net

Knives.
Ames' Butcher Knives.....dis 20 %
" Shoe " .....dis 15 %
Hay and Straw, "Wadsworth's".....dis 20 %

Knobs.
Base—Common.....net
" Plush Tip.....dis 10 %
" Elastic End.....reduced list dis 10&10 %
Trenton Lock Co.....dis 40 %

Lanterns.
Brady's Patent.....dis 10 %
Ætna.....dis 10 %
Yankee.....dis 10 %
De Beque.....dis 10 %

Locks and Latches.
Cabinet—Eagle.....dis 25 %
Cabinet—Gaylord.....dis 25 %
Trunk.....dis 10 %
Continental.....dis 15 %
Shepardson's.....dis 20 %
Trenton Lock Co.....dis 40 %
Branford.....dis 40 %
Norwich.....dis 40 %

Meat Cutters.
Dixon's (P. S. & W.).....dis 10 %

No.	1	2	3	4
₱ doz.	$14 00	$17 00	$19 00	$30 00

Hales'.....dis 25 %

No.	11	12	13
₱ doz	$27 00	$36 00	$42 00

Perry's Champion (P. S. & W.).....dis 10 %

No.	200	300	400
₱ doz.	$22 00	$27 00	$40 00

Woodruff's (P. S. & W.).....dis 10 %

No.	100	150
₱ doz.	$15 00	$18 00

American.....dis 25 @ 25&5 %

No.	1	2	2½	3	4	5
Each	$6 00	$9 00	$14 00	$15 00	$30 00	$75 00

Molasses Gates.
Stebbins' Pattern.....dis 60&10 %
Tinned ends.....dis 40&10 %
Weed's Patent Self-Boring.....dis 15 %
" without Auger Bit.....dis 40 @ 50 %
Patent Self-Measuring.....per doz $42 00—dis 20 %

Mouse Traps.
Wood Choker.....₱ doz holes, 16 @ 20c

Nails.
10d Cut (Standard).....$4 75

Nuts and Washers.
Nuts.....large, 4c; small, 5c off list.
Washers.....large, 5c; small, 7c off list

Oil Stones.
Washita No. 1.....₱ ℔ 22c
" Slips.....₱ ℔ 44c
Hindostan.....₱ ℔ 6c dis 10 %
" Slips.....₱ ℔ 10c dis 10 %

Oilers.
Olmsted's.....dis 25&10 %
Broughton's.....dis 25&5 %
Common Zinc, Brass and Copper.....dis 25 %

Picks.
Washoe R. R. Nos.

₱ doz	1	2	3	4	5
	$14·00	15·00	16·00	17·00	18·00

Washoe Coal, " $8·50 9·00 10·00 11·00 13·00 15·00

Picture Nails and Knobs.
Richards' Patent.....dis 40 @ 40&10 %

Planes.
Sandusky Tool Co., 1st quality.....dis 20 %
" " 2d " (Ogontz).....dis 20&10 %
Ohio Tool Co., 1st quality.....dis 20 %
" " 2d quality (Sciota).....dis 20&10 %
Owasco Tool Co., 1st quality.....dis 25 %
" " 2d quality.....dis 25&10 %
Plane Irons.....list net
" Butcher's.....$5 50 to £ gold—new list
" Spear & Jackson's.. 5 50 to £ gold—new list
" Sandusky Tool Co.....list net

Plumbs and Levels
Standard Rule Co.'s New Adjustable.....dis 50&10 %

Pumps.
Douglas Cistern, etc.....new list dis 25 %
" S. & F. " .....new list dis 20 %

Rakes.
Cast Steel.....dis 35 %

$8 00	9 00	10 00	11 00
8	10	12	14 teeth.

Razor Straps.
Genuine Emerson.....dis 35 %
" " in 5 gross lots.....dis 30 %
Hunt's.....dis 25&10 %
Chapman.....dis 10 @ 15 %

Rivets.
Iron and Tinned.....dis 25 %
Copper Rivets and Burrs.....dis 10 %

Rods.
Stair.....new list dis 25 %
American Patent.....dis 25 %

Rope. Manufacturers' List
Manila.....¼ inch and larger ₱ ℔ 18 c
" .....⅜ inch ₱ ℔ 18½c
" .....¼ and 5-16 inch ₱ ℔ 19 c
" Lath Yarn.....₱ ℔ 19 c
" Hay Rope.....₱ ℔ 18½c
Sisal.....½ inch and larger ₱ ℔ 16 c
" .....⅜ inch ₱ ℔ 16½c
" .....¼ and 5-16 inch ₱ ℔ 17 c
" Hay Rope.....₱ ℔ 16½c

Rules.
Hubbard & Curtiss Mfg. Co.....new list net
Stanley Rule and Level Co.'s Ivory.....dis 50&10 %
" " " Boxwood.....dis 6 &10 %
Standard Rule Co.'s Boxwood.....dis 60&10 %
" " " Ivory.....dis 50&10 %

Sad Irons.
₱ ℔ 4½c net
Sad Iron, Nickel Stand attached.....₱ ℔ 9c

Sand Paper—dis 7½ @ 10 %
Beader & Adamson's (Flint) 00 to 1½.....$4 50 ₱ ream
" " " 2, 2½ & 3.....5 00 "
" " " 4 50 "
Assorted.....₱ ream $3 50
Star.....₱ ream $7 00 @ 12 00
Emery.....dis 7½ @ 10 %
Cowdin Mfg. Co.....per ream $4 50
Diamond Flint, 0 to 1½.....5 00
" " 2, 2½, 3 and assorted.....
" Emery Paper.....per ream $7 00 to 12 00

Sash Locks.
Clark's.....dis 20 %
Fergusen's.....dis 20 @ 25 %
Champion.....₱ gross $13 00 @ $15 00
Norwich.....dis 15 %

Sash Weights.
Solid Eyes.....₱ ℔ 2¾c

Sausage Fillers.
Perry's (P. S. & W.).....dis 10 %

No.	1	0
₱ doz.	$15 00	$21 00

Saw Rods.
.....dis 10 %

Saws.
Spear & Jackson's.....$4 50 to £ gold
.....$3 60 to £ gold
Am. Saw Co.....new list
Perforated Cross Cuts, all kinds.....68c ₱ foot
Inserted Tooth.....dis 10 %
All else.....dis 12½ %
Disston's.....dis 10 %
H. W. Peace's Circulars.....dis 10 %
Other kinds.....dis 10 %
Wm. McNiece's Hand, Cross Cut and Circular.....new list dis 10 %
E. M. Boynton's Lightning.....dis 30 %
" " Others.....dis 10 %

Scales.
Brown's.....dis 25&5 %
Fairbanks'.....new list dis 15 @ 20 %
Howe's.....dis 15&5 %
Shattuck's Counter and Union.....dis 15 %
National Platform.....dis 25 %
Eureka.....dis 25 %
Scale Beams.....dis 20 %
No. 1 300 to 1200 lbs.....90c ₱ cwt
No. 2 " " .....75c ₱ cwt

Screws.
American list of April 1, 1873.
Flat Head Iron.....dis 47½ %
Round Head Iron.....dis 45 %
Flat Head Brass.....dis 60 %
Round Head Brass.....dis 50 %
Round Head Silver Capped.....new list dis 20 %
Hand Rail.....dis 10 %
Coach or Lag.....dis 25 %
Coach, Patent Gimlet Point.....dis 5%
Bed.....list net

Scythes.
Blood's German Steel, Grass.....₱ doz $9 00
" Cast " " .....₱ doz 10 00
" Silver " " .....₱ doz 11 00
" German " Grain.....₱ doz 13 00
" Cast " " .....₱ doz 14 00
" Red Rover.....12 00
" Young America.....9 50
" Silver Clipper.....12 63
Scythe Snaths.....dis 20 %

Shears.
Cast Steel.....dis 60&10 %
Conn. Cutlery Co., new brand.....dis 60 %
Rowe's.....dis 50&10 %

Shovels and Spades.
Ames.....new list dis 10 %
Rowland.....new list Feb. 8, '73, dis 20 %
Old Colony.....dis 2½ %

Shovels and Tongs.
Iron Head.....list net
Brass Head.....dis 5 %
Polished Steel.....new list dis 15 %

Slates.
Square Frames, Round Cornered, by case.....dis 60&10 %
Less than a case.....dis 50 @ 55 %
Oval Frames, by case.....dis 40 @ 40&10 %
Less than a case.....dis 30 %

Spoons.
Iron.....new advanced list, dis 10 %
By the case.....dis 20 %
Britannia.....dis 40 %
Plated A 1.....revised list dis 30&5 %
German Silver.....revised list dis 15&5 %
Tinned (P. S. & W.)—
Teas.....$1·50 ₱ gross, net
Tables.....2·75 " net

Stocks and Dies.
.....dis 15 %

Stove Polish.
Joseph Dixon's.....₱ gross, $6 00 @ 6 25
National.....₱ gross $4 75
Gold Medal.....₱ gross $6 00, dis 15 %
Gem.....₱ gross $5 00, dis 10 %

Squares.
Steel.....dis 50 %; full cases, dis 50&10 %
Iron.....dis 50 %; full cases, dis 50&10 %
Nickel Plated.....add $2 50 @ $4 00 ₱ doz net
Try Squares and T Bevels.....dis 45&10 %
Star Try Squares and Bevels.....dis 30 %

Tacks.
Full Weight American Iron.....dis 35&7½ %
Half Weight American Iron.....dis 67½&7½ %
Carpet.....dis 7½ %
Brads American Half Weight.....dis 50&7½ %
Finishing Nails.....¼ ⅜ ½ 1 1¼ in. and over
₱ ℔.....25c 20c 18c 14c 13c dis 7½ %
Trunk and Clout.....¼ ⅜ ½ 1 1¼ in. and over
₱ ℔.....25c 20c 18c 14c 13c dis 7½ %
Copper Tacks.....₱ ℔ 56c—dis 7½ %
Iron Shoe Nails, ₱ ℔ 4-8 and longer, 10½c; 3½-8, 11c.....dis 7½ %
Double Pointed.....new list dis 33⅓ %

Tapes, Measuring.
American Flask and Cap Co.....dis 10&10 %
Eddy's.....dis 10&10 %

Toe Calks.
₱ ℔ 13c net

Tobacco Cutters.
Champion.....dis 20 %
Peck, Stow & Wilcox.....dis 10 %

Tinners' Tools and Machines.
P. S. & W.....list net

Traps.
Newhouse.....dis 20 %
Hotchkiss.....dis 20 %
Peck, Stow & Wilcox.....dis 20 %
Blake's Patent.....dis 15 @ 20 %

Vises.
Trenton Vises, Solid Box.
80 to 110 lbs.....17c
111 to 160 lbs.....18c
160 and over.....21½c
Peter Wright's.....₱ ℔ 15½c. gold
Wilson's Solid Box.....dis 10 @ 15 %
120 to 160 lbs.....18c
160 and upwards.....21c
Backus & Union, Parallel.....dis 25 %
Buffalo, Parallel.....new list dis 15 %
Fisher & Norris' Double Screw Parallel.....dis 15 @ 15&5 %

Wire.
Bright and Annealed.....No. 0 @ 18 dis 20 @ 35 %
" " .....19 @ 26 dis 40 @ 45 %
" " .....27 @ 36 dis 45 @ 50 %
Coppered.....No. 0 @ 18 dis 22½ @ 27½ %
Galvanized, Nos. 6 to 12.....dis 35 @ 40 %
Galvanized, Nos. 13 to 18.....dis 40 @ 45
Tinned.....dis 15 @ 20 %
Cast Steel.....5 @ 10 %
Tinned Broom Wire.....dis 20 @ 25 %
Galvanized Telegraph, Nos. 8 and 9.....₱ ℔ 10c @ 11c
" " 10 and 11.....₱ ℔ 11c @ 12c
" " 12.....₱ ℔ 11½c @ 12½c
Annealed Fence, Nos. 8 and 9.....dis 30 @ 35 %
" Grape, " 10 to 14.....dis 30 @ 35 %
Fence Staples.....₱ ℔ @ 9¼ c
Stubs' Steel Wire.....$7 00 to ₱ gold

Wrenches.
American Adjustable.....dis 45 %
Baxter's Adjustable "S".....dis 20 %
" Diagonal.....dis 20 %
Collins & Co.'s.....new dis list 30 %
Coes Genuine.....dis 40 %
" Pattern (Wrought).....dis 50 %
" " (Malleable).....dis 50&10 %
Lindsay's Patent.....dis 25 %
Taft's Pattern.....dis 65&10 %
Davis' Patent Duplex.....new list dis 25 %

TIN WARE.

STAMPED TIN WARE.

Basins.
Wash Basins, Handled, Plain Stamped.....dis 20 %

Inch	10	11	11½
Per doz.	$3·50	4·00	4·50

Wash Basins, Handled, Retinned.....dis 25 %

Inch	10	11	11½
Per doz.	$4·00	4·50	5·00

W

FINE WIRE—NET PRICES.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 26	0·45	0·49	0·55
No. 27	0·48	0·52	0·58
No. 28	0·50	0·54	0·60
No. 29	0·52	0·56	0·62
No. 30	0·54	0·58	0·66
No. 31	0·56	0·60	0·70
No. 32	0·60	0·64	0·75
No. 33	0·64	0·68	0·85
No. 34	0·68	0·72	0·95
No. 35	0·73	0·77	1·07
No. 36	0·82	0·86	1·19
No. 37	1·02	1·02	1·32
No. 38	1·32	1·32	1·62

Ten cents per pound extra for Spooling.

TUBING.

(Brown & Sharpe's Gauge.)

	₩ lb.
Plain to No. 20, inclusive	$0 58
Nos. 21, 22, 23, 2c. advance on List for each No.	
Nos. 24, 25, 26, 4c. " " "	
Above No. 26 special rates.	
Plain Tube, 1-4 inch	74
" 9-16 "	1 52
" 1-8 "	1 84

All Mandrel-Drawn Tubes 5c. advance on List.
Fancy Tubing 4c. advance on List above Plain.
English, Scotch, and Extra Patterns Fancy Tubing to No. 20.
Tubing sawed or cut 2 to 4 ft. long, 2c. advance on List.
Add to two cents a half-cent for each additional cutting under two feet. 10 ℅ discount.
BRASS DOOR RAIL Polished—54 cents per lb.—10 ℅

BELT AND HOSE COPPER RIVETS AND BURS.

Price per lb	57	58	60	62	64	66	68	72	76c
Nos.	7	8	9	10	11	12	13	14	15

Braziers Rivets, 51 cents per pound discount 10 ℅.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire
4 per cent. 12 inch. to No. 26	1·10	1·15
6 " " "	1·10	1·25
10 " " "	1·25	1·45
15 " " "	1·35	1·60
18 " " "	1·45	1·75
20 " " "	1·55	

Discount 10 ℅.
German Silver Sheets over 12 inches wide and weighing more than 10 lbs. $2·25 ₩ lb net
Advance two cents for each additional inch in width above 12 inches, and two cents per pound on each No. thinner than Nos. 26 to 36, inclusive.
All German Silver thinner than No. 36 is Platers' at 50 cents per pound additional.
German Silver Scrap, one-third less than net price of 12 inch Market Metal; German Silver Turnings, Filings and Chips, half the price of Scrap.
* Brown & Sharp's Gauge is about two numbers finer than Stubs' Wire Gauge.

COPPER—DUTY: Pig, Bar and Ingot, 5c.; old copper, 4 cents ₩ lb; Manufactured (including all articles of which copper is a component of chief value) 45 ℅ ad valorem. All subject to a reduction of 10 per cent.

American Ingot ₩ lb 26 @ 26½c
English " "

SHEATHING, BRAZIERS' COPPER, BOLTS, &C.

Braziers Copper, ordinary sizes, over 16 oz., per square foot	40c ₩ lb
Braziers' Copper, ordinary sizes, 16 oz. and over 12 oz., per square foot	43c. "
Braziers Copper, 12 oz. per square foot and lighter	46c. "
Circles less than 24 inch in diameter	43c. "
Circles, 24 inch diameter and over	46c. "
Segment and Pattern Sheets	43c. "
Locomotive Fire Box Sheets	40c. "
Sheathing Copper, over 12 oz. per sq. ft.	38c. "
" 12 oz. ₩ sq. ft. and lighter	46c. "
Bolt Copper	40c. "

No Copper in Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

TINNING.

14x48, by the case	8c. ₩ sheet
14x48, less than case	10c. "
Boiler Sizes, 7 and 8 inch	12c. "
" 9 inch	15c. "
Other sizes not larger than 30x60	2½c. ₩ sq.
Larger than 30x60	5c. "
Copper Bottoms, 38c. ₩ lb	net

O'NEILL'S PATENT PLANISHED COPPER.

14x48.
14 and 16 oz. and heavier 44c. By the case, 43c. ₩ lb
12 oz. and lighter 47c. " 46c. "

Boiler Sizes.

7 in., 14x82. 8 in., 4x56. 9 in., 14x60
14 and 16 oz. and heavier 46c. By the case, 45c. ₩ lb
(And all sizes not over 20 inches wide.)
30x60
14 and 16 oz. and heavier 53c. ₩ lb
12 oz. 51c. "

LEAD—DUTY: Pig, $2 per 100 lbs.; old Lead, 1¼ cent. per lb.; Pipe and Sheet, 2½ cents per lb. All subject to a reduction of 10 per cent.

Spanish	6¼ @ 6¾c gold
German Refined	6¾ @ 6¾c gold
English	@ 7¼c gold
Bar	dis 10 ℅ 9¼c.
Pipe	dis 10 ℅ 10½c.
Tin Lined Pipe	dis 10 ℅ 16½c.
Sheet	dis 10 ℅ 10½c.
Shot	dis 10 ℅ Drops, 11½c.; Buck, 12½c.
Solder No. 1, 20c. @ 21c. No. 2, 19c. @ 20c.	

STEEL—DUTY: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2¼ cents; over 7 cents, and not above 11, 3 cents per lb.; over 11, 3¼ cents per lb. and 10 ℅ ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. All subject to a reduction of 10 per cent. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as Steel.

American Cast Steel.

Tool	17c
Spring	18½c
Homogeneous	13½c
Tire	12½ @ 13½c
Machinery (round and square)	11½ @ 12c
File	12½c
Sheet	14 @ 16c
Saw Plate, mill and mulay	14 @ 16½c
Saw Plate, gang and X cut, circular as to size	13 @ 14c 15 @ 30c

Chrome Steel.

Tool	₩ lb 20 @ 21c
Tool, extra fine	" 40 @ 75c
Spring	₩ lb 12c and upward
Machinery	₩ lb 14c.
Hammer	" 15c.
Gun or Homogeneous	" 16c.

English Steel,—payable in gold, dis 5 ℅ cash.

" Best Cast	₩ lb 19½c
" Extra Cast	" 20½c
" Round Machinery, Cast	" 12½c
" Swaged, Cast	" 21½c
" Best Double Shear	" 19½c
" Blister, 1st quality	" 15½c
" " 2d quality	" 13½c
" " 3d quality	" 11½c
German Steel, Best	" 12½c
do Eagle	" 11½c
do 3d quality	" 10½c
Sheet Cast Steel, 1st quality	19½c
" " 2d quality	" 17½c

SPELTER—DUTY: In Pigs, Bars and Plates, $1 50 per 100 lbs.—less 10 per cent.

Silesian, cash	7¼ @ 7¾c., gold
American "	8 @ 11c., currency

TIN—DUTY: Plates, Sheets, Tagger and Terne, 15 per cent. ad val.; Electro-galvanized Plates, 2 cents per lb; Manufactures of, not enumerated, 35 per cent. ad val.—all subject to a reduction of 10 per cent. Bars, Banca or Block, and Pigs, free.

Banca	₩ lb 34c., gold
Straits	₩ lb 31c., gold
English	₩ lb 29c., gold

CHARCOAL TIN PLATE.

I C 10x14, Prime Charcoal	12·0
12x12, "	12·50
14x20, "	12·75
I X 10x14, "	14·25
12x12, "	14·73
14x20, "	15·25
For each additional X add	2·25

COKE TIN PLATE.

	Best.	2d Quality.	Ordinary
I C 10x14	$11·50	$10·50	9·00 @ $10·00
I C 12x12	12·00	11·00	
I C 14x20	12·00	11·00	

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$11·50	11·00	8·50 @ 10·50
I X 14x20	13·75		

ZINC.—DUTY: Pig or Block, $1 50 per 100 lbs. Sheet, 2½c. ₩ lb. All subject to a reduction of 10 per cent.

Sheet	cask 10c
"	open 10½c

Paper Stock, Old Metals, &c.

(Dealers' Selling Prices.)

Canvas linen	6 @ 7
" cotton, No. 1	7 @ 7¼
" " No. 2	4
White linen rags, No. 1	6½ @ 7
" " No. 2	4½ @ 5
Colored	3 @ 3½
Mixed woolens	2 @ 3
Soft woolens	6 @ 7
Gunny bagging	1½ @ 1¾
Jute Butts	1¾ @ 2
Kentucky bagging	3½ @ 3¾
Book stock	4 @ 4½
Waste paper and scraps	1½ @ 2
Rope cuttings	1½ @ 2
Kentucky Bale rope	4 @ 4½
Oakum junk, No. 1	6
" No. 2	3½ @ 4
Grass rope	4 @ 4½
Tarred Shaking	1½ @ 1

Old Metal.

Copper	24 @ 25
Yellow metal	18 @
Brass	18 @ 19
Heavy Composition	21 @ 23
Old lead, solid	6½ @ 7
Tea lead	5½
Wrought Iron	1½ @ 1¾
Sheet Iron	1 @
Cast Iron	1 @ 1¼
Machinery Iron	1¼ @ 1¾
Zinc	6
Pewter, No. 1	26 @ 27
" No. 2	10 @ 12
Spelter	7

Paints, Oils, etc.

Paints.

Black, lamp—Coach Painters	₩ lb 20c
" " Ordinary	6c
" Ivory Drop, fair	15c
" " best	36c
Black Paint, in oil	kegs, 8c.; asst'd cans, 11 c
Blue, Prussian, fair to best	50 @ 75c
" " " in oil	55 @ 65c
" Chinese, dry	85c
" Ultamarine	25 @ 30c
Brown, Spanish	1½c
" Van Dyke	9c
Carmine, 40	$12 0
Green, Chrome	15 @ 23c
" " in oil	18 @ 25c
" Paris	good, 30c; best, 40c
" " in oil	30c; " 45c
Mineral Paints	1¼ @ 4c
Orange Mineral	14½c
Red Lead, American	9¼c
" " English	10½c
" Venetian (N. C.) dry	2¾c
" " in oil	asst'd cans, 11c; kegs, 8½c
" Indian, dry	10c
Rose Pink	18c
Sienna, American, Raw	4c
" Burnt	4½c
" " in oil	16 @ 20c
" Raw "	15 @ 25c
Umber, Burnt	4 @ 8c
" " in oil	16 @ 21c
" Raw	3½ @ 7½c
" " in oil	16 @ 22c
Vermillion, Chinese	$1 45
" English	1 45
" Trieste	1 38
" American, Common	23c
White Lead, American, pure dry	11 c
" " " in oil	11½c
White, Paris, English, prime	in bbls. 2½ @ 2¾c
Yellow Ochre French	2½ @ 2¾c
" " in oil	asst'd cans, 11c; kegs, 8½c
" Vermont	In casks 1½c
" Chrome	17 @ 22c
" " in oil	18 @ 25c
Zinc White, American No. 1 dry	9c
" " 1, in oil	11c
" French (Paris)	11 c
" " in oil	12 c

Oils.

Linseed Raw	₩ gal. casks, 97c. bbls. 93c.
" Boiled	" $1·02 " $1·03
Whale, Crude	"
" Bleached Winter	"
Sperm, Crude	"
" Winter unbleached	"
" " Bleached	" 1·80
Seal, Extra Refined	" 87½c
Lard, Pure Winter	" 80c
" Spring	" 76c
Cotton seed, Crude	" 55c
" Southern Yellow	" 65c
" White	" 75c
Neatsfoot, Winter	$1·10 @ $1·35
Natural Lubricating	bbls, 45c

Sundries.

Asphaltum	9c
Benzine	₩ gal. 16c
Chalk	1½c
" Block	
Dryer, Patent, Am'n	asst'd cans, 10½c.; kegs, 9c
" " English	" 11c.; " 9c
Flocks	
Frostings	50c
Glue, White	30 @ 47c
" Sheet	30c
Glaziers' Points, Zinc	9c
Gum, Copal	36c
" Damar	25c
" Shellac, English	66c
" " dark	46c
Litharge	10c
Pumice Stone, selected Lumps	4 @ 6c
" powdered	4c
Putty in bladders	3½c
" in bulk	3c
Rotton Stone, soft, English	8c
Spirits Turpentine	42c
Whiting, Spanish	1½c

Glass.

French Window—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SINGLE.

SIZES.	I.	II.	III.	IV.
6 x 8 to 7 x 9	$8·00	$7·00	$6·75	$6·00
8 x 10 to 10 x 14	8·50	8·00	7·25	6·50
10 x 15 to 12 x 16	9·00	8·50	8·00	6·75
13 x 16 to 16 x 20	9·50	9·00	8·50	7·75
15 x 22 to 15 x 30	11·75	10·50	10·00	8·00
16 x 30 to 22 x 30	14·25	12·25	11·00	9·50
15 x 38 to 22 x 36	15·00	13·50	12·00	
24 x 36 to 24 x 40	15·75	14·25	12·50	
28 x 38 to 28 x 42	16·25	14·75	13·25	
28 x 44 to 28 x 50	17·25	15·75	14·25	
30 x 50 to 30 x 54	20·50	17·00	15·50	
32 x 54 to 34 x 56	21·50	19·25	17·50	
34 x 58 to 34 x 60	23·00	21·50	20·25	
36 x 60 to 40 x 60	26·00	24·25	23·00	

DOUBLE.

SIZES.	I.	II.	III.	IV.
6 x 8 to 7 x 9	$13·00	$12·00	$11·50	$10·00
8 x 10 to 10 x 14	14·00	12·75	12·00	10·75
10 x 15 to 12 x 16	15·00	14·00	13·25	11·25
13 x 16 to 16 x 20	16·00	15·00	14·00	12·50
15 x 22 to 15 x 30	20·00	17·50	16·50	13·25
16 x 30 to 22 x 30	22·00	19·25	17·75	15·00
15 x 38 to 22 x 36	23·75	20·50	19·25	
24 x 36 to 24 x 40	24·75	22·50	20·00	
28 x 38 to 28 x 42	26·00	23·50	21·00	
28 x 44 to 28 x 50	27·50	25·50	22·50	
30 x 50 to 30 x 54	31·00	28·50	24·00	
32 x 54 to 34 x 56	32·50	29·00	26·50	
34 x 58 to 34 x 60	34·50	33·00	31·00	
36 x 60 to 40 x 60	39·50	36·50	35·00	

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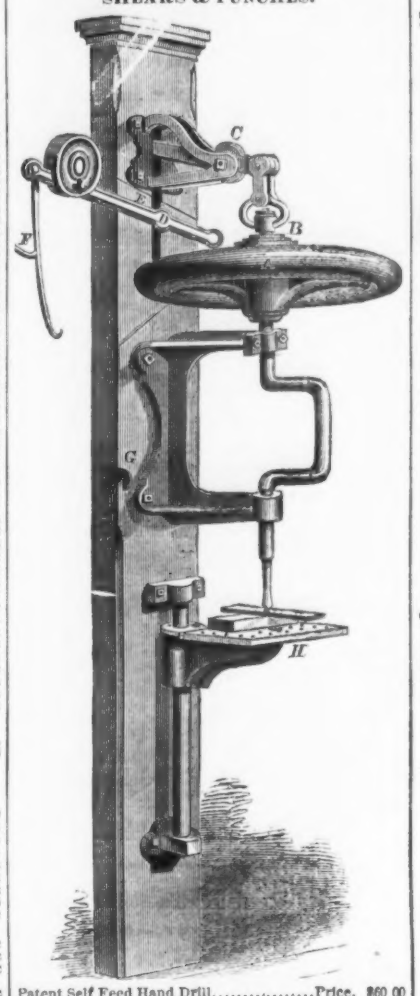

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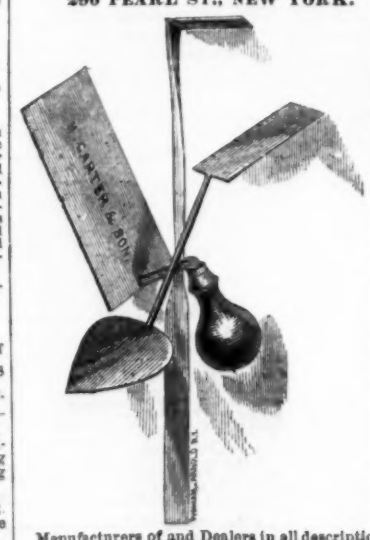

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Otis Bros. & Co., 348 Broadway, N. Y.....9
Todd & Rafferty Machine Co., 10 Barclay, N. Y.....29

Horse Hay Forks and Fixtures, *Makers of.*
Nellis A. J. & Co., Pittsburgh, Pa.....36

Horse Nails. *Makers of.*
Ausable Horse Nail Co., 35 Chambers, N. Y.....3
Brundage & Co., Middletown, N. Y.....10
Globe Nail Co., Boston, Mass.....3
Pratt & Co., Buffalo, N. Y.....25
Putnam S. S. & Co., Neponset, Mass.....31

Horse Shoes, *Makers of.*
Burden Iron Works, Troy, N. Y.....4

Hubs and Spokes, *Mfrs. of.*
Gleason J., 2nd and Diamond, Phila.....12

Hydraulic Jacks.
Dudgeon Richard, 24 Columbia, N. Y.....28

Ice Cream Freezers, *Makers of.*
Torry E. S. & J., 166 Fulton, N. Y.....23

Insurance, Boiler.
Hartford Steam Boiler and Inspection Co.....13

Iron Brokers.
Boynton Geo. A., 70 Wall, N. Y.....6
Hazard & Jones, 212 Pearl, N. Y.....4
Petit Wm. H., 72 Wall, N. Y.....4

Iron, Corrugated. *Manufacturers of.*
Corrugated Metal Co., East Berlin, Conn.....4
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y.....4

Iron, Charcoal, *Warm or Cold Blast.*
Quincy John W., 98 William, N. Y.....4

Iron Commission Merchants.
Blakiston & Cox, 333 Walnut, Phila.....5
Hand Jas. C. & Co., 614 and 616 Market, Phila.....16
Hoopes W. Graham, 419 Walnut, Phila.....5
Malin Bros., 228 Dock, Phila.....5

Iron, Pig, *Importers of.*
Williamson James & Co., 69 Wall, N. Y.....4

Iron Dealers.
Abeel Brothers, 120 South, N. Y.....4
Bonnell, Botsford & Co., Youngstown, O.....4
Borden & Lovell, 70 and 71 West, N. Y.....4
Cleveland, Brown & Co., Cleveland, O.....6
Coddington T. B. & Co., 25 Cliff, N. Y.....4
Conklin & Huerstel, 99 Market Slip, N. Y.....4
Fuller, Lord & Co., 139 Greenwich, N. Y.....4
Fuller, Dana & Fitz, 110 North, Boston.....2
Gardner Wm., 575 Grand, N. Y.....4
Kimbark Bros. & Co., Chicago.....4
Harrison & Gilloon, 558 to 562 Water, N. Y.....4
Hart G. A., 208 Walnut, Phila.....5
Jackson & Chase, 206 and 208 Franklin, N. Y.....4
Judson D. F., 457 and 459 Water, N. Y.....4
Matthews Chas. W., 133 Walnut, Phila.....5
Packard, Goff & Co., Youngstown, O.....4
Pettee & Mann, 228 and 229 South, N. Y.....4
Piersons & Co., 24 Broadway, N. Y.....4
Pope Thos. J. & Bro., 202 Pearl, N. Y.....6
Quincy John W., 98 William, N. Y.....4
Richards D. W. & Co., 32 Mangin St., N. Y.....4
Smith Gam'l G. & Co., 343 Pearl, N. Y.....4
Warner A. & Sons, 28 and 29 West, N. Y.....4
Williamson James & Co., 69 Wall, N. Y.....4
Whitney Alfred R., 58 Hudson, N. Y.....4

Iron, *Manufacturers of.*
Ashong & Co., 31 Beekman, N. Y.....4
Britannia Iron Works, Middlesbro', Eng.....6
Burden Iron Works, Troy, N. Y.....4
Cleveland Rolling Mill Co., Cleveland, O.....6
Coffin Wm. E. & Co., 8 Oliver, Boston.....4
Ellis W. R. & Co., 17 Batterymarch, Boston.....4
Everson, Graff & Macrum, Pittsburgh, Pa.....4
Fulton S. & Co., 412 Walnut, Phila.....5
Jones & Laughlins, Pittsburgh, Pa.....4
Leonard John, 450 & 451 West st., N. Y.....4
Lynchburg Iron Works, Lynchburg, Va.....4
Milwaukee Iron Co., Milwaukee, Wis.....6
Niles Iron Co., Niles, O.....4
New Haven Rolling Mill Co., New Haven, Ct.....6
Old Dominion Iron & Nail Works Co., Richmond, Va. 6
Oxford Iron Co., 81 Washington, N. Y.....4
Phœnix Iron Co., 410 Walnut, Phila.....5
Rowland Wm. & Harvey, Phila.....36

Iron, Swedish. *Importers of.*
Jessop Wm. & Sons, 91 and 93 John, N. Y.....32
Mitander Nils, 62 William, N. Y.....4
Page Ewd. & Co., Boston, N. Y. and Phila.....4

Lace Leather, *Manufacturers of.*
Stoyle Wm. H., 403 Library, Phila.....31

Lanterns, *Manufacturers of.*
Dietz R. E., (Tubular) 54 and 56 Fulton, N. Y.....36
Howard & Morse, 45 Fulton, N. Y.....2
Shepard Sidney & Co., Buffalo, N. Y.....6

Lawn Mowers, *Manufacturers of.*
Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.....29

Lead and Tin Lined Lead Pipe, etc., *Mfrs.*
Colwell Lead Co., 213 Centre, N. Y.....2

Locks, *Manufacturers of.*
Bohannan Wilson, Broadway and Kossuth, Brooklyn, E. D.....2
Branford Lock Works, Branford, Conn.....12
Norwich Lock Co., Norwich, Conn.....9
Romer & Co., Newark, N. J.....2
Sargent, Greenleaf & Cole, 300 Broadway, N. Y.....23
Trenton Lock Co., 48 Warren, N. Y.....8
Yale Lock Mfg. Co., 298 Broadway, N. Y.....25

Machinery, *Makers of.*
Billings & Spencer Co., Hartford, Conn.....8
Fishkill Landing Mch. Co., 63 Biecker, N. Y.....34
Gear A. S., 56 to 62 Sudbury, Boston.....34
Mason W. W. & Co., Providence, R. I.....34
Chanin Machine Co., New Hartford, Conn.....12
Paulding, Kemble & Co., 30 Broadway, N. Y.....9
Pratt & Whitney Co., Hartford, Conn.....34
Rollstone Machine Works, Fitchburg, Mass.....35
Sellers Wm. & Co., 1600 Hamilton, Phila.....24
Watson Andrew, 537 Dickinson, Phila.....35
Whitehill, Smith & Co., Newburgh, N. Y.....28
Wood Thomas, 2106 Wood, Phila.....34

Machine Screws, *Makers of.*
American Screw Co., Providence, R. I.....15
Lyon & Fellows Mfg. Co., Williamsburg, N. Y.....8

Machinists.
Demarest, Joyce & Co., Brooklyn, E. D.....8
Eccles James, 2423 Lombard, Phila.....28
Ellis T. & Bro., 2306 Court, Phila.....6
Heald S. & Sons, Barre, Mass.....8

Machinists' Tools, *Makers of.*
Bliadell P. & Co., Worcester, Mass.....33
Blundell Henry & Co., Providence, R. I.....35
Freeland Tool Works, 558 & 560 W. 24th, N. Y.....35
Harrington Edwin, 15th st. and Pa. ave., Phila.....35
Lincoln Geo. S. & Co., Hartford, Ct.....34
Star Tool Co., Providence, R. I.....29

Machinery and Tool, *Importers of.*
Churchill Charles & Co., 28 Wilson St., Finsbury, London, England.....10

Malleable Iron and Steel Castings.
Carr, Crawley & Devlin, 307 Arch, Phila.....6

Meat Cutters, *Makers of.*
Newton D. A. & Co., 106 Chambers, N. Y.....17
Vulcan Mfg. Co., 61 Warren, N. Y.....13
Whittemore D. H. Worcester, Mass.....14

Metal Dealers and Brokers.
Coddington T. B. & Co., 25 and 27 Cliff, N. Y.....2
Cragin Bros. & Co., 141-3 Lake, Chicago, Ill.....2
Crane U. O., 234 John, N. Y.....2
Phelps, Dodge & Co., Cliff, bet. John & Fulton, N. Y. 2
Pope Thos. J. & Bro., 202 Pearl, N. Y.....2
Quincy J. W., 98 William, N. Y.....2
Thomson A. A. & Co., 213 and 215 Water, N. Y.....2
Van Wart & McCoy, 43 Chambers, N. Y.....2

Metallurgists.
Britton J. Blodgett, 339 Walnut, Phila.....28
Drown Thomas M., 1128 Girard, Phila.....28
Henderson James, 30 Broadway, N. Y.....28
Maynard & Van Rensselaer, 24 Cliff, N. Y.....28
School of Mines, E. 49th, N. Y.....28

Mining and Railroad Tools, &c., *Makers of.*
Washoe Tool Mfg. Co., 61 Park Place, N. Y.....27

Molders' Tools.
Carter H. & Sons, 290 Pearl, N. Y.....35

Monuments, *Granite and Bronze.*
National Fine Art Foundry, 218 E. 25th.....6

Mouse Traps. Catchemalive. *Makers of.*
Dietz R. E., 54 and 56 Fulton, N. Y.....36

Nickel Platers.
Smith L. A., 42 Mechanic st., Newark, N. J.....31

Norway Shapes, *Rollers of.*
Rowland Wm. & Harvey, 948 Beach, Phila.....36

Note Broker.
Gallaudet P. W., 3 and 5 Wall, N. Y.....6

Nuts, Bolts, etc., *Makers of.*
Ætna Nut Co., Southington, Conn.....14
Arms, Bell & Co., Youngstown, O.....14
Carpenter David, 402 Water, N. Y.....4
Clark Bros. & Co., Millsdale, Conn.....12
Fuller, Lord & Co., Boonton, N. J.....4
Haskell W. H. & Co., Pawtucket, R. I.....14
Lewis, Oliver & Phillips, Pittsburgh and N. Y.....14
Plumb, Burdict & Barnard, Buffalo, N. Y.....36
Rhode Island Nut Co., 11 Warren, N. Y.....14
Sternbergh J. H., Reading, Pa.....14

Oilers, *Makers of.*
White J. H., Newark, N. J.....30

Ore Crushing Machines, *Makers of.*
Blake Crusher Co., New Haven, Conn.....34

Paints and Oils, *Dealers in.*
Devoe F. W. & Co., 117 Fulton, N. Y.....

Patent Adjustable Elbows.
Sargent, Greenleaf & Cole, 300 Broadway, N. Y.....23

Patent Soliciters.
Howson & Son, Phila. and Washington, D. C.....33
Leggett & Leggett, Washington, D. C.....17
Whitney J. A., 128 Broadway, N. Y.....33

Picture Nails, etc., *Manufacturers of.*
Richards T. C. & Co., 47 Murray, N. Y.....2

Pipes, Fittings, etc., *Makers of.*
Eaton & Cole, 58 John, N. Y.....8
McNab & Harlin Mfg. Co., 56 John, N. Y.....8
Nelson, Finkel & Co., 439 E. 10th st., N. Y.....8
Pancoast & Manle, 227 Pear, Phila.....8
Chas. Gregg Mfg. Co., 62 and 64 Gold, N. Y.....8

Pipe, Water and Gas, *Makers of.*
Brick R. A. & Co., 112 Leonard, N. Y.....6
Graff William & Co., Pittsburgh, Pa.....8
Morris, Tasker & Co., 15 Gold, N. Y.....8
National Tube Works Co., 78 William, N. Y.....8
Starr Jesse W. & Sons, Camden, N. J.....6
Warren Foundry & Mach. Co., Phillipsburg, N. J.....8
Wood R. D. & Co., 173 Broadway, N. Y.....6

Plane Irons, *Manufacturers of.*
Middletown Tool Co., Middletown, Conn.....12
Sandusky Tool Co., Sandusky, O.....30

Planes, *Manufacturers of.*
Greenfield Tool Co., Greenfield, Mass.....13
Ohio Tool Co., Columbus, O.....8
Sandusky Tool Co., Sandusky, O.....30
Stanley Rule & Level Co., 85 Chambers, N. Y.....30

Plumbago Lubricator.
N. Y. Black Lead Works, 172 Forsyth, N. Y.....36

Plumbers' Materials, *Manufacturers of.*
Carr Wm. S. & Co., 106 Centre, N. Y.....8

Presses, Power. *Makers of.*
Am. Saw Co., 1 Ferry, N. Y.....36
Peck Milo & Co., New Haven, Ct.....28
The Stiles & Parker Press Co., Middletown, Ct.....35

Pressure Blowers. *Makers of.*
Blackburn, B. F., 11th and Hamilton, Phila.....36
Sturtevant B. F., 72 Sudbury, Boston.....35

Pumps, *Makers of.*
Douglas W. & B., Middletown, Conn.....7
Rumsey & Co., Seneca Falls, N. Y.....7
Union Mfg. Co., 55 Chambers, N. Y.....7
Valley Mch. Co., Easthampton, Mass.....7

Rails, *Importers of.*
Congreve Chas. & Son, 104 and 106 John, N. Y.....32
Smith Gilead A. & Co., 62 Broadway, N. Y.....4

Rails, Iron or Steel, *Makers of.*
Atkins Bros., Pottsville, Pa.....6
Cambria Iron Co., Johnstown, Pa.....5
Cleveland Rolling Mill Co., Cleveland, O.....6
Evansville Rolling Mill Co., Evansville, Ind.....6
Griswold John A. & Co., Troy, N. Y.....32
Milwaukee Iron Co., Milwaukee, Wis.....6
Springfield Iron Co., Springfield, Ills.....4
The Cincinnati Railway Iron Works, Cincinnati, O..6
Joliet Iron & Steel Co., Joliet, Ills.....6

Railway Supplies.
Post & Co., Cincinnati, O.....14

Razor Straps, *Makers of.*
B. F. Badger, Charlestown, Mass.....13

Rolling Mill Machinery, etc., *Manufacturers of.*
Moore James, Cor. 16th and Buttonwood, Phila.....35

Rolls, Chilled and Sand, *Makers of.*
Garrison A. & Co., Pittsburgh, Pa.....4

Rules, *Manufacturers of.*
Chapin E. M. Pine Meadow, Ct.....7

Sash Chain.
Thomas Morton, 15 Murray, N. Y.....8

Saws, *Makers of.*
Atkins E. C. & Co., Indianapolis, Ind.....10
American Saw Co., 1 Ferry, N. Y.....10
Boynton E. M., 80 Beekman, N. Y.....10
Flint J., Rochester, N. Y.....10
Disston Henry & Sons, Phila.....10
McNeice Wm., 515 Cherry, Phila.....10
James Ohlen, Columbus, O.....10
Peace Harvey W., Williamsburg, N. Y.....10
Spear & Jackson, 116 Duane, N. Y.....27
Wheeler, Madden & Clemson, Middletown, N. Y.....10
Woodrough & McFarlin, Cincinnati, O.....10

Saw Frames, Wood, *Makers of.*
Peace Harvey W., Williamsburg, N. Y.....10

Scales, *Manufacturers of.*
Brandon Mfg. Co., Brandon, Vt.....9
Patterson Bros., 27 Park Row, N. Y.....36
Riehle Bros., 9th near Coates, Phila.....10
Shattuck W. F. & Co., 113 Chambers, N. Y.....16

Scissors, *Manufacturers of.*
Rowe & Post, 120 Chambers, N. Y.....11
U. S. Steel Shear Co., W. Meriden, Ct.....12

Screws, *Makers of.*
American Screw Co., Providence, R. I.....15
Miles F. S., 205 Quarry, Phila.....28

Screws, *Importers of.*
Bruce Geo. W., 1 Platt, N. Y.....16
Field Alfred & Co., 47 John, N. Y.....12
Guental George, 39 W. 4th, N. Y.....10

Self Oilers.
Nathan & Dreyfus, 108 Liberty, N. N.....36

Sewing Machines.
Wilson Sewing Machine Co., 707 Broadway, N. Y.....30

Shovels, &c.
Clement & Hawkes Mfg. Co., Northampton, Mass.....8

Smelting Works.
Du Plaine & Reeves, 760 S. Broad, Phila.....36

Skates.
Graham & Haines, 88 Chambers, N. Y.....30
Peck & Synder, 125 Nassau, N. Y.....14
Union Hardware Co., 130 Chambers, N. Y.....15

Stamped and Japanned Tin Ware.
Farrington J. D., Jr., 38 Murray, N. Y.....23
Shepard Sidney & Co., Buffalo, N. Y.....23

Steam Hammers, etc., *Makers of.*
Dudgeon Richard, 24 Columbia, N. Y.....35
Ferris & Miles, 24th and Wood, Phila.....35

Snaps, Harness, *Makers of.*
Middletown Tool Co., Middletown, Conn.....12

Speed Indicators, *Makers of.*
Connecticut Cutlery Co., Naugatuck, Conn.....31

Squares, Steel and Iron, *Makers of.*
Hart, Bliven & Mead Mfg. Co., 248 Pearl, N. Y.....9

Steam Pumps, etc., *Manufacturers of.*
Carr A. 43 Cortlandt., N. Y.....29
Hall C. Henry & Co., 20 Cortlandt, N. Y.....9
Philadelphia Hydraulic Works, Evelina street, east of Third street, Phila.....35

Steam Traps.
Alonzo L. Jones, 150 S. 4th, Phila.....29

Steel Importers.
Carr J. & Riley, 82 John, N. Y.....32
Cocker Bros., Sheffield, England.....32
Congreve Chas. & Son, 104 and 106 John, N. Y.....32
Hobson Francis & Son, 97 John, N. Y.....32
Jessop Wm. & Sons, 91 and 93 John, N. Y.....32
Moss F. W., 80 John, N. Y.....32
Piersons & Co., 24 Broadway, N. Y.....4
Sanderson Bros. & Co., 16 Cliff, N. Y.....32
Sanderson Geo. & Co., 57 John, N. Y.....32
Van Wart & McCoy, 43 Chambers, N. Y.....32
Wardlow S. & C., 13 Gold, N. Y.....32
W. Hawksworth, Ellison & Co., 72 John, N. Y.....32

Steel Manufacturers.
Anderson & Woods, Pittsburgh.....33
Chrome Steel Co., Brooklyn, E. D.....38
Cleveland Rolling Mill Co., Cleveland, O.....6
Gautier D. G. & Co., Jersey City, N. J.....32
Griswold John A. & Co., Troy, N. Y.....32
Hussey, Wells & Co., Pittsburgh.....33
Miller, Barr & Parkin, Pittsburgh.....32
New Jersey Steel and Iron Co., Trenton, N. J.....33
Reese, Graff & Woods, Pittsburgh.....33
Reiter, Lavelly & Co., Pittsburgh.....33
Rowland Wm. & Harvey, 948 Beach, Phila.....36
Singer, Nimick & Co., Pittsburgh.....32

Stone Crushing Machines.
Blake Crusher Co., New Haven, Ct.....34

Stoves.
Esser William & Co., Cincinnati, O.....29

Stove Boards, *Manufacturers of.*
Shepard Sidney & Co., Buffalo, N. Y.....29

Stove Polish, *Makers of.*
"Gem" Stove Polish, 172 Forsyth, N. Y.....36

Twist Drills, *Makers of.*
Morse Twist Drill & Mach. Co., N. Bedford, Mass....34

Tackle Blocks, *Makers of.*
Burr & Co., 81 Peck Slip N. Y.....14

Tacks.
American Tack Co., 117 Chambers, N. Y.....31
Field A. & Sons, Taunton, Mass.....31
Grundy & Kenworthy, 165 Greenwich, N. Y.....31
Dunbar, Hobart & Whidden, S. Abington, Mass.....31
Loring Samuel, Plymouth, Mass.....31

Tea Trays. *Importers of.*
Dickinson Henry, 66 and 68 Reade, N. Y.....11

Tinmen's Tools and Machines, *Makers of.*
Peck, Stow & Wilcox Co., 97 Chambers, N. Y.....25

Trowels, etc., *Makers of.*
Rose Wm. & Bros., 36th and Filbert, W. Phila.....10

Turbine Water Wheels, *Manufacturers of.*
Stout, Mills & Temple, Dayton, O.....25
Merrill & Houston, Beloit, Wis.....25
Whitehill, Smith & Co., Newburgh, N. Y.....28

Tubes, Seamless Brass and Copper, *Manufacturers of.*
Merchant & Co., 507 Market, Phila., Pa.....8

Tubes, Wrought and Galvanized, *Manufacturers of.*
Griffith I. J. & Bros., Philadelphia, Pa.....8

Tube Expanders.
Dudgeon Richard, 24 Columbia, N. Y.....28

Valves, Gas, Water and Steam.
Ludlow Valve Mfg. Co., N. Y.....23

Vises.
Backus Vise Co., 78 Beekman, N. Y.....22
Fisher & Norris, Trenton, N. J.....22
Howard Iron Works, Buffalo, N. Y.....22
Wilson Mfg. Co., 57 Chambers N. Y.....28

White Lead, *Manufacturers of*
Brooklyn White Lead Co., 89 Maiden Lane, N. Y.....29
Colgate Robert & Co., 287 Pearl, N. Y.....29
Cornell Lead Co., Buffalo, N. Y.....29
Jewett John & Sons, 182 Front, N. Y.....29
Lewis John T. & Bros., 231 S. Front, Phila., Pa.....29
Union White Lead Co., 26 Burling Slip, N. Y.....29

Wire, *Manufacturers of.*
Gilbert, Bennett & Co., 273 Pearl, N. Y.....2
Philadelphia Wire Works, N. 5th, Phila.....2
Prentiss Geo. W. & Co., Holyoke, Mass.....3
Townsend W. P. & Co., Pittsburgh, Pa.....4
Washburn & Moen Mfg. Co., Worcester, Mass.....2

Wire Goods. *Manufacturers of.*
Chicago Wire Cloth Mill, Chicago, Ill.....2
Gilbert, Bennett & Co., 273 Pearl, N. Y.....2
Howard & Morse, 45 Fulton, N. Y.....2
Hopkins A. W., West Broadway, N. Y.....3
Howe, Bigelow & Co., Worcester, Mass.....2
Parker Sam'l & Co., Wethersfield, Ct.....2

Wire Rope, Iron and Steel, *Makers of.*
Roebling's John A. Sons, Trenton, N. J.....3

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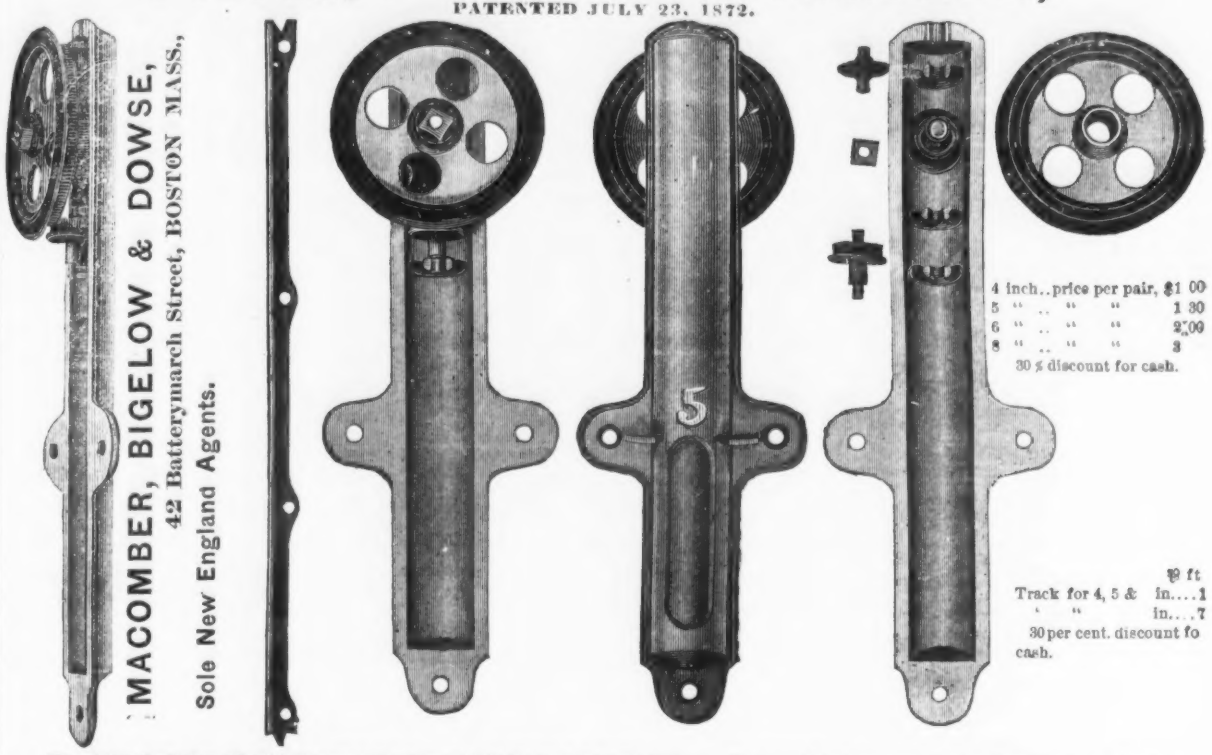
PATENTED JULY 23, 1872.



4 inch..price per pair, $1 00
5 " .. " " 1 30
6 " .. " " 2 00
8 " .. " " 3
30 % discount for cash.

Track for 4, 5 & 6 ft in....1
" " in....7
30 per cent. discount fo cash.

We, without hesitation, offer this Hanger as the best article in the market for the purpose. Its many advantages over all other Hangers are as follows

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2nd.—It is provided with a friction wheel at the top of the Case, which bears against the rear or outside of the sheaves, and prevents it from **leaning outward** and causing it to **RUN TRUE,** a feature not attained in any other Hanger.
3d.—By thus causing the sheave to run true, the doors are always held up **Close to the Frame,** and maintain a close joint around it.
4th.—The sheave has but one flange, there being a lower friction wheel provided with a flange which extends out under the face of the sheave and bears against the outer side of the track, which takes the place of the extra flange in the sheave, thus doing away with the **grooved sheave** which always grinds or breaks
5th.—**IT CAN NEVER RUN OFF THE TRACK.**
6th.—It is the **easiest running** Hanger made, our 5 in. answering the same as 6 in. of the checkback and ordinary makes.
7th.—It is the Most Complete Hanger, in its construction, being tasty, as well as durable.

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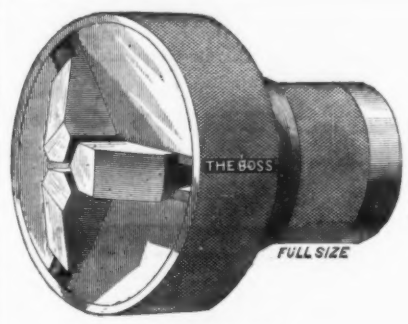

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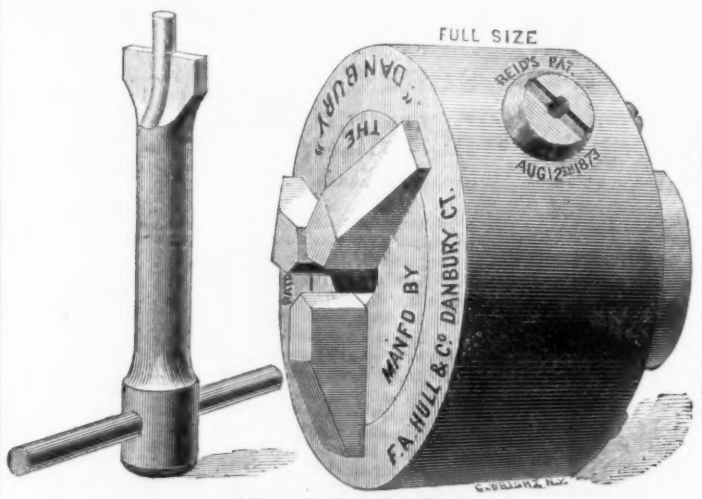

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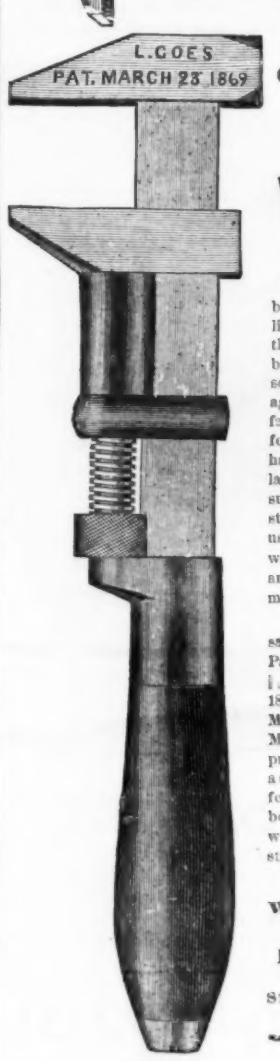

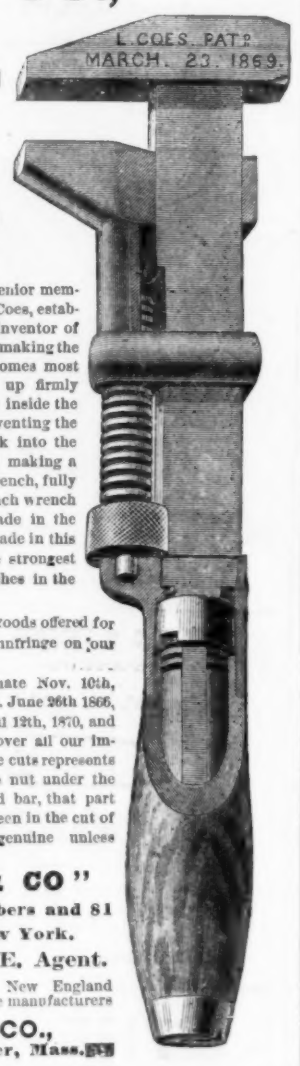

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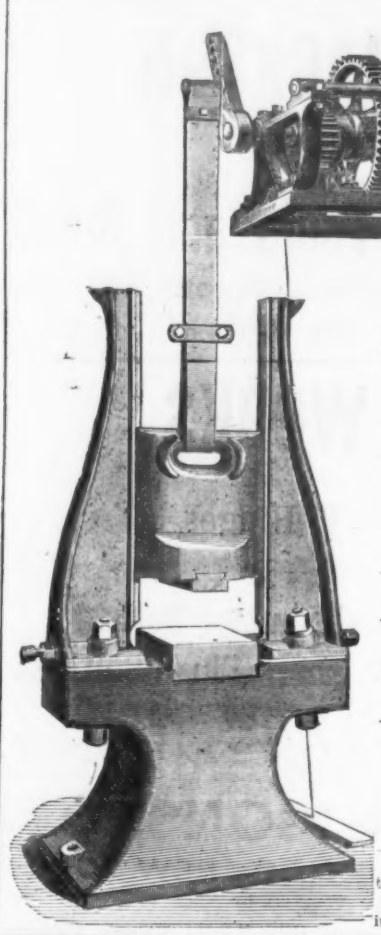

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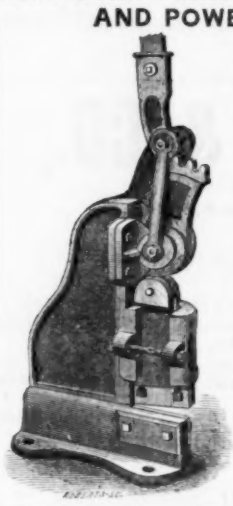

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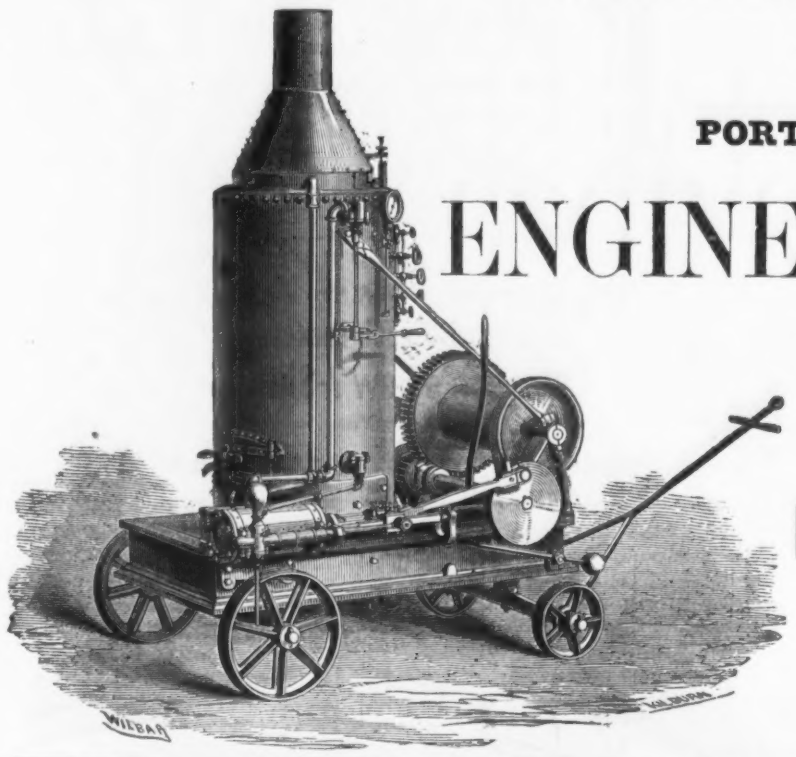

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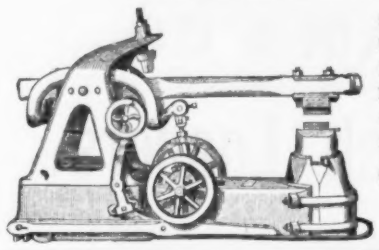

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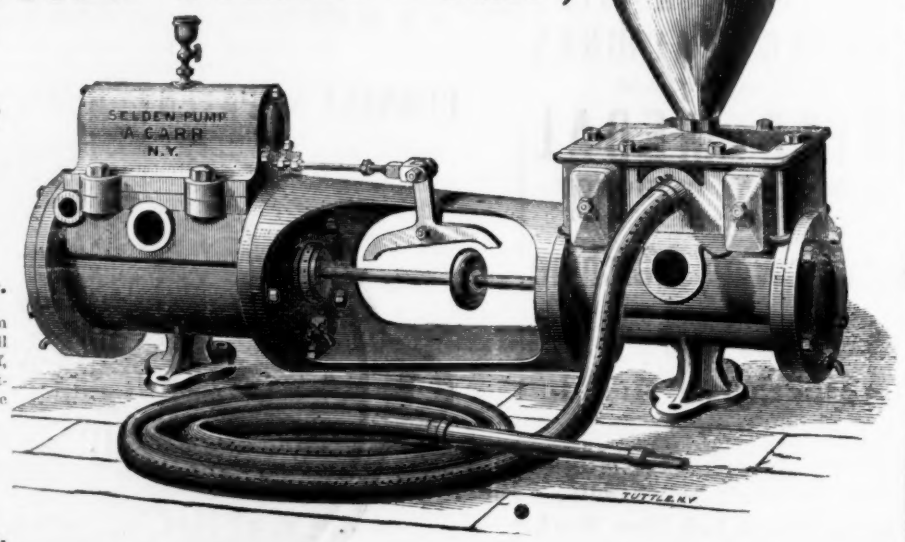

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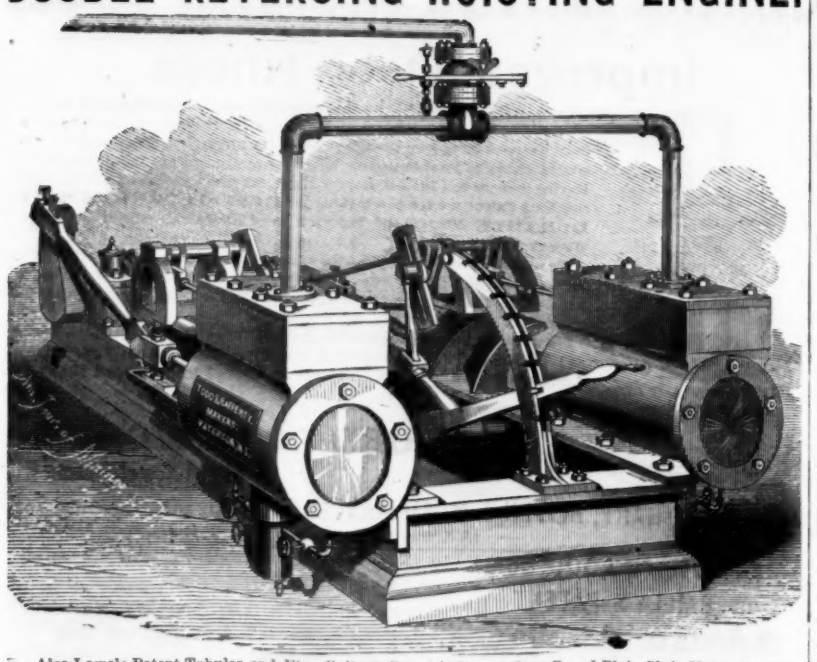

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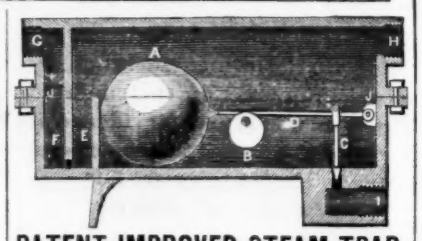

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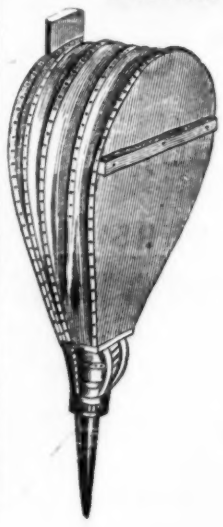

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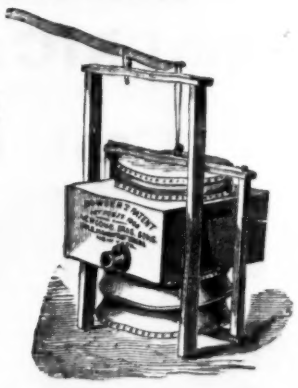

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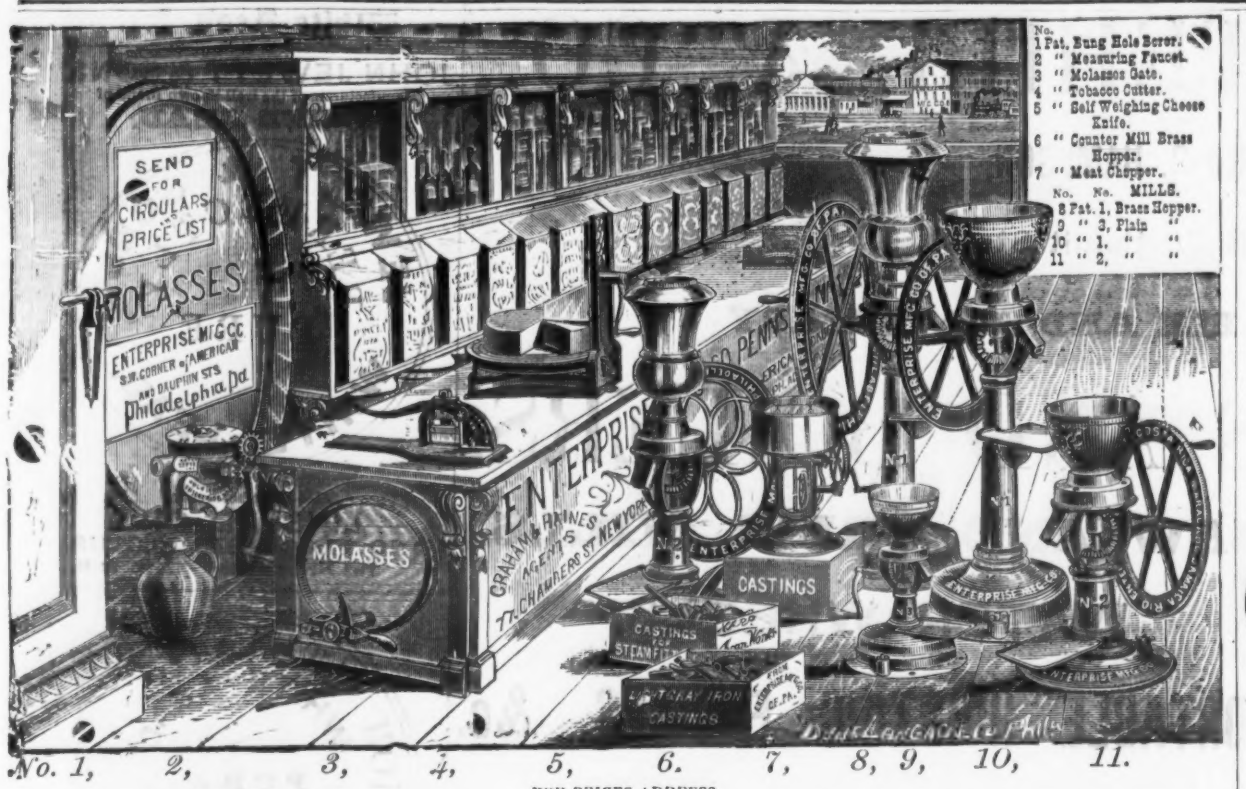
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A tool well made of **Best Materials**, combining all the good qualities of a regular Nut Wrench of equal size with that of at least six pairs of Pipe Tongs. For circulars and price lists, address,

PHILADELPHIA TOOL Co., Office & Works, S. W. cor. 13th & Buttonwood Streets, Phila.,
Or *GRAHAM & HAINES, Agents, 88 Chambers Street N. Y.*

AMERICAN BUTT CO.,

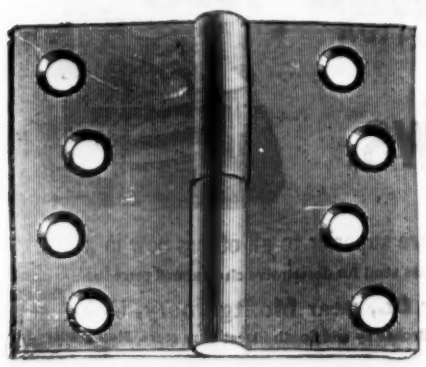
PROVIDENCE, R. I., Manufacturers of

Cast Butt Hinges,

AND

BUILDERS'

HARDWARE.



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Al kinds of

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Made to order.

AGENCY

SMITH & WESSON

Revolvers,

WESSON RIFLES,

DEXTER

BREECH LOADING SINGLE GUN.

79 Chambers St., N. Y.

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VIENNA PREMIUMS.

THE WILSON SHUTTLE

SEWING MACHINES

Received the Grand

PRIZE MEDAL

AND MEDAL OF HONOR

FOR THE

Best Sewing Machine

The Best made Sewing Machines,

And Three

Co-Operative Medals

FOR

The Best Made Set of Harness,
The Best Made Side Saddle,
The Best Boot and Shoe Work,
And the Best Samples of Cloth Sewing.

No other Sewing Machines received Premiums on their merits, which we will prove by evidence at our office, and that all reports relating to the contrary are fal-

AGENTS WANTED,

WILSON SEWING MACHINE CO.,

707 Broadway, New York,

And all other cities in the United States.

OILERS! OILERS!

J. H. WHITE, Newark, N. J.,

MANUFACTURER OF

Olmsted Patent and Common Oilers,

of all descriptions,

Colwell Patent Door Spring Children's Carriage Trimmings, Spun and stamped Brass for all Trades, Dies and Tools &c., &c.

SCHOVERLING & DALY,

84 and 86 Chambers Street, NEW YORK.

MANUFACTURERS OF

CHARLES DALY Breech Loading Guns.

Side Snap, Golcher and Scott Systems,

Equal in every respect to the highest priced. Send for Illustrated Catalogue.

New Standard Revolvers,

XX uses Metal Cartridge No. 22.
XXX " " " No. 30.

Quality, first-class; style, similar to Smith & Wesson; price, $2·50 to $3·00 less.

Vest Pocket O. K. & Never Miss

Single Cartridge Pistols.

Sole Agents for

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Celebrated Breech Loaders,

Wesson's New 7-Shot

Revolver; Wrought Iron Frame, beautiful model, work unsurpassed.

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Bottom prices, careful attention, prompt dispatch.

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279 BROADWAY, NEW YORK,

"Scott's Breech Loaders."

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Colt's New Cartridge Revolvers, very compact and positively perfect.

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Factories at KENSINGTON, CONN.

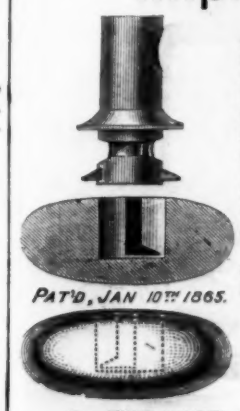
MANUFACTURERS OF

CONNELL'S PATENT GONG DOOR BELLS.

With Crank & Pull Handles, in Brass, Nickel Plated & Bronzed Meta.

Send for our New Catalogue and Price List.

Improved Door Knobs.



On the 10th January, 1865, we obtained Letters Patent for improved method of securing necks to Mineral and Porcelain Door Knobs, which improvement was used by us long enough to prove its utility, but on account of unsettled claim of joint ownership by former partner, its use was discontinued. Having now made a further improvement, for which we have made application for a Patent, we are now making the **BEST SECURED** and **MOST DURABLE** Mineral and Porcelain Door Knobs ever offered in this or other markets.

We solicit orders for these Knobs at our regular prices for old styles, with the understanding that if any can be loosened from or gotten off the necks without breaking the tops, they may be held by the purchaser subject to our order, with expenses added.

See *The Iron Age*, of August 21st,, page 11, for reduced list prices on Locks and Latches; also, for illustrated description of our patent **Telescope Locks and Latches,** with patent Flat **Steel Perforated Keys,**

Address

BRANFORD LOCK WORKS,

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Or THE HART, BLIVEN & MEAD MANUFACTURING CO., Agents,

18 & 20 Cliff and 243 & 245 Pearl Streets, New York.

☞ Over 60,000 Sold.

BAILEY'S PATENT

Adjustable Planes.

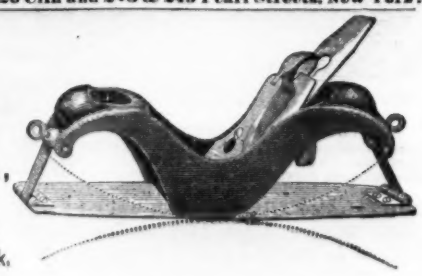
Manufactured by the

Stanley Rule & Level Co.,

NEW BRITAIN, CONN.

Sold by all Hardware Dealers.

Warehouse, 55 Chambers St., New York.



PHILADELPHIA.

(Corrected weekly by Lloyd, Supplee & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.—Sold Cast Steel.....₱ ℔ 12½c
Peter Wright's.....₱ ℔, gold, 13c @ 12½c
Wilkinson's.....11½c
Eagle.....₱ ℔ 12 cents, currency—dis 10 @ 15 %
Apple Parers.—Reading Improved.....per doz $8 50
Victor, Improved..... " 8 25
Union, " ..... " 8 00
Turn Table, " ..... " 6 50
Discount for 25 dozen lots..... 50c
Axes.—Mann's Light.....Per doz. $13 00 @ 14 00
Hunt's Light..... " 14 00 @ 14 50
Red Indian, all sizes..... " 12 50 @ 12 00
Red Chieftain, all sizes..... " 12 50 @ 13 00
Crown Prince..... " 13 50 @ 13 00
Augers and Auger Bits.—Pierce's Pat. Twist Bits.....dis 25 %
Bates' & Ives' Bits.....dis 30 %
Douglass' Bits.....dis 30 %
Cook's Bits.....dis30 @ 30&10 %
Bonney's Pat. Hollow Augers.....dis 25 %
Russell Jennings' Bits.....dis 10 %
Bates' & Ives Nut Augers.....dis 30 %
Douglass Nut Augers.....dis 30 %
Watrous' Ship Augers.....dis 10 %
Balances.—Landers, Frary & Clark's.....dis 55 %
Chattillon's.....dis 15 %
Morton's.....dis 15 %
Common Spring, with Hook.....₱ doz $1 38 @ 2 00
Bells.—Bevin Bros. Mfg. Co. Hand Bells.....dis 50&10 %
" Extra Light Hand Bells.....dis 60 %
Other makers light.....dis 55 @ 60 %
Connell's Door Bells.....old list net
Western and Kentucky.....dis 50 %
Boring Machines.—Bates' Mfg. Co., complete with augers.....dis 10 @ 15 %
Douglas' Mfg. Co., complete with augers..dis 10 @ 15 %
Common Augers.....$4 25 @ 4 00
Angular, Extra Auger.....5 50 @ 5 00
Bolts.—Eastern Carriage Bolts.....dis 70 %
Western " " .....dis 70 %
Philadelphia " " .....dis 50 %
Wrought Shutter Bolts.....dis 45 %
Cast " " .....dis 35 %
Braces.—Barber's.....dis 40 %
Bartholomew's.....dis 10 @ 15 %
Spoffard.....dis 37½ %
Butts.—Cast Fast Joint, Narrow.....dis 40 %
" " Broad.....dis 40 %
Cast Loose Joint.....dis 50 %
" Acorn Drilled.....dis 40 @ 40&5 %
Wrought Loose Pin.....dis 30&5 %
" Table Hinges and Back Flaps.....dis 30 %
" Narrow.....dis 30&5 %
" Loose Joint.....dis 35&5 %
Parker's Blind Butts.....dis 40 %; by the case, dis 40&10 %
Shepard's " " .....
Clark's " " .....
Garretson's " .....dis 45 %; by the case, dis 50 %
Lull & Porter's " .....dis 25&10 %
Chains.—German Halter.....gold list dis 20 @ 25 %
" Coil.....gold list dis 20 @ 25 %
Galvanized Pump.....₱ ℔ 15c
Best Proof Coil Chain—

₱ ℔	13¾	10¾	10	9½	9¼	9	8¾c gold
	3-16	¼	5-16	⅜	7-16	½	⅝ in.

By the cask, 560 lbs., discount ½c per lb. Common Chain, ½c per lb. less than proof.
Chisels.—Socket Framing.....dis 60 @ 60&5 %
Socket Firmer.....dis 60 @ 60&5 %
Tang " .....dis 40 @ 40&5 %
Beaty's Framing and Firmer.....dis 10 @ 10&5 %
Casters.—Porcelain Wheel.....dis 20&10 %
Iron.....dis 20&10 %
Brass.....dis 20&10 %
Clothes Wringers.—Universal.....per doz $72 00
Novelty..... " 72 00
Reliance..... " 72 00
Providence..... " 72 00
Orders for 5 dozen, discount $3 per dozen.
King Wringers (Iron Frame).....per doz $68 00
Coffee Mills.—Common Box and Side.....dis 10 @ 15 %
Patent Box and Side.....dis 10 @ 15 %
Cutlery.—American Pocket (best).....dis 20 @ 25 %
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices.
Drawing Knives.—Hart Mfg. Co.'s.....dis 60 @ 60&5 %
Concave Adjustable Handle.....dis 10 %
Beaty.....dis 10 %
Files.—Nicholson Mill Files.....new list, $5 00 to £ cur
Nicholson Bastard..... " 5 00 to £ cur
" Taper..... " 5 00 to £ cur
Butcher's Mill.....$5 75 to £ gold
" Bastard..... 5 50 to £ gold
" Taper..... 5 50 to £ gold
Moss & Gamble—Mill, Taper and Bastard.....5 50 @ 5 25 to £ gold
Fluting Machines.
Royal, No. 1, 4½ inch Rollers.....list $6 00
" No. 2, 6 " " .....list 7 00
Hammers and Hatchets.
Yerkes & Plumb's.....dis 10 %
Hammond & Son's.....dis 5 %
Beatty's.....dis 10 %
Hinges.—Strap and T.....dis 20&7½ @ 30&10 %
Bonney's No. 1 Gate.....dis 25 %
" No. 2 and 3.....dis 35 %

Horse Nails.	Nos.	6	7	8	9	10
Ausable		27	25	24	23	22
Globe		29	26	25	24	23
Brundage		26	24	23	22	21
	Nos.	5	6	7	8	9
Putnam		32	28	26	25	24
On Ausable, Globe and Brundage 1000 ℔ lots						dis 5 %

Knobs.—Door (regular manufacture).....dis 40 %
Porcelain and Mineral.....dis 40 %
Locks and Latches.—Rim and Mortise.....dis 40 %
Till and Cupboard.....dis 25 %
American Padlocks.....dis 40 %
Trunk Locks.....dis 5 @ 10 %
Thumb and Roggens Latches.....net @ dis 10 %
Mattocks.—Long and Short Cutter.....dis 15 %
Western Pattern.....dis 15 %
Pennsylvania Pattern.....dis 15 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.....dis 20 %
Stebbins' Gates.....dis 60 @ 60&10 %
Lincoln's " .....dis 40 @ 40&10 %
Landers, Frary & Clark's Petroleum...dis 10 @ 10&10 %
Taylor's Petroleum Faucets.....dis 20 @ 20&10 %
Rakes.—Cast Steel Garden.....dis 30 %
Malleable Garden.....dis 33½ %
Wood Head Iron Teeth.....dis 30 @ 40 %
Rules.—Stanley Rule and Level Co.....dis 60 @ 30&10 %
Steven's and Hubbard's.....dis 60 @ 60&10 %
Squares.—Steel and Iron, new list.....dis 50 %
Saws.—Disston's Cross Cut.....dis 12½ %
Disston's Hand.....dis 12½ %
W. McNiece's H'd. Cross-Cut & Cir'r, new list..dis 15 %
Boynton's Lightning, new list.....dis 30 %
Shovels and Spades.
Rowland's Plain Back, list Feb. 1873.....dis 20&10 %
" Back Strap " .....dis 20&10 %
Oliver Ames & Sons.....new list dis 10 %
Brady Shovel Co.....dis 7½ %
Sad Irons.—Reading (planed face).....per lb. 4½c.
Coquanock (polished face)..... " 4½c.
Stove Polish.—Gem.....₱ gross, $5 00
Onyx..... " $5 00
Scythes.—Golden Clipper.....₱ doz. $11 50
Clipper No. 10..... 10 50
Common Scythes.....₱ doz $7 00 @ 10 00
Screws.—Iron.....new list, April 1st, 1873, dis 47½ %
Brass.....dis 50&10 %
Spoons.—
Plated Spoons, Rogers Bros.'...new list dis 30 @ 30&5 %
Britannia. Spoons.....dis 40 @ 40&5 %
German Silver.....new list dis 10 @ 15 %
" Light.....new list dis 15&5 %
Try Squares.—Disston's.....dis 12½ %
Stanley Rule and Level Co.....dis 40&10 %
Willis Thrall, No. 2.....dis 30&10 %
Willis Thrall, No. 1.....dis 25&10 %
Tacks, &c.—Half Weight Tacks.....dis 67½ %
" " by the case.....dis 67&7½ %
Clout and Finishing Nails.....7½ %
" " " by the case.....dis 7½ %
Traps.—Genuine Oneida—Newhouse list.....dis 20 %
Imitation " " " .....dis 20&10 %
Wrenches.—Coes Genuine.....dis 30&10 %
Coes Imitation Wrought Bar.....dis 45 @ 45&5 %
" " Malleable Bar.....dis 50 @ 50&5 %
" " (Kellogg) Malleable Bar.....dis 55 @ 60 %
Tafts Pattern.....60&10 %
" " Kelloggs.....dis 60&10 %
Wire.—No. 0 to 18.....dis 30 @ 32½ %
No. 19 to 26.....dis 40 %
No. 27 to 36.....dis 33⅓ @ 35 %
Coppered 0 to 12.....dis 15 @ 20 %
Tinned Broom Wire.....dis 15 @ 30 %

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.

Oct. 11, 1873.

Axes, Chopping—"Francis Axe Co '.....$13 00 @ $14 50
Augers—C. S. Cut.....dis 30&10 %
Bits, Auger—Pierce s.....dis 25 %
Jennings'.....dis 10 %
Bells, Cow—Yaw's Genuine.....dis 20 %
Bellows—Smiths'.....dis 20 %
Bolts—Carriage and Tire.....dis 70&10 %
Braces, Bit—Barber's.....dis 40 %
Spofford's Patent.....dis 40 %
Brads, Cut.....dis 50&7½ %
Boards—Stove, Brooks' Patent.....dis 30 %
Butts—Brass.....dis 20 %
Cast Loose Joint.....dis 50 %
" " Pin.....dis 45 %
" " Japanned.....dis 45 %
" " Silver Tipped.....dis 25 %
Wrought Narrow.....dis 30 %
" Broad, Loose Joint.....dis 35 %
" Table and Back Flaps.....dis 25 %
Wrought Butts, Loose Pin.....dis 35 %
Belting—Rubber.....dis 30 @ 35½ %
Leather, new list.....dis 30 @ 30&5 %
Beaters, Egg, "Peerless".....per doz $4 50
Brick—Bath (box of 2 doz) Best English.....$1 50
"Rutherford".....$1 25
Bung Borers—"Enterprise".....dis 20 %
Chalk—White, Carpenter's.....₱ gross, 60c
Red, Carpenter's..... " 80c
Blue, " ..... " 90c
Crayon School ..... " 14c
Chisels—Firmer Socket.....dis 60&10 %
Framing Socket.....dis 60&10 %
Corner Socket Chisels.....dis 60&10 %
Slick's Carpenters'.....dis 60&10 %
Castings—Malleable.....₱ ℔ 10½c
Cherry Seeders.....per doz $12 00
Elbows—Corrugated.....5 5½ 6 7
Charcoal.....$4 25 5 25 5 25 6 50 } dis 15 %
Russia.....10 00 13 00 13 00 14 00 }
Files—Wheeler, Madden & Clemson's.....dis 45 %
Freezers, Ice Cream—"Champion".....dis 33⅓ %
Gates—Molasses—
Patent Self-Measuring.....₱ doz., $42 00; dis 20 %
Hinges—Window Blind—
Clark's No. 20.....dis 50&5 %
Shepard's Standard, and Clark s.....dis 40&10 %
Garretson s.....dis 40, 10&10 %
Wrought Strap and T.....dis 30&7½ %
Hods, Coal—Plain, Black and Galvanized.....net @ 10 %
Funnel, Black and Galvanized.....net @ 10 %
Fancy and Helmet.....net @ 10 %
Palace Coal Vases.....net
Hammers—Maydole's.....net
Yerkes & Plumb's.....dis 5 @ 10 %
Hooks and Staples—Wrought.....dis
Hooks—Belt.....dis 50 %
Hasps and Staples—Wrought.....dis 60 %
Sad Irons.....₱ ℔ 5c
Kettles—Brass.....₱ ℔, 50c
Enameled.....new list dis 40 %
Knives, Drawing—Oval No. 1.....dis 60&10 %
Razor Blade.....dis 50&10 %
Lanterns "Peerless,".....No. 1 5 10
₱ doz $26 00 $11 25 $13 75 dis 10 %
"Radiant".....No 75 100 150 175
₱ doz $13 13 $13 13 $22 50 $22 50 dis 20 %
Tubular.....$13 00
" with Guards.....13 50
Machines—Apple Paring. "Reading."....$8 50 ₱ doz
Mills, Coffee—Box and Slide, common.....dis 15 %
Box Union and Eagle.....dis 15 %
"Enterprise".....dis 20 %
Nails—Cut, Chesapeake.....$4 50
Clout and Finishing.....dis 7½ %
Shoe.....dis 7½ %
Horse, Ausable.....No. 5 6 7 8 9 10
30 27 25 24 23 22c
" " Finished & Pointed.....add 1c ₱ ℔
" " 1000 lbs.....dis 5 %
" Clinton.....No. 6 7 8 9 10
22 20 19 18 17c
Packing—Rubber.....dis 30 @ 33⅓ %
Pencils, Slate—Soapstone.....4 5 6 in.
30 40 50c. ₱ 100
Case lots.....dis 20 %
Paint—White Lead, U. S. Gov't.....₱ ℔ 9 c
Rivets—Iron. Black and Tinned.....dis 20 @ 25 %
Copper.....dis 10 %
Rope—Manila, ¾ inch and larger.....₱ ℔ 15½c
Rules—Boxwood and Ivory, Stephens.....dis 50&10 %
Screws—"American Screw Co"—
Flat Head, Iron.....dis 47½ %
Flat Head, Brass.....dis 60 %
Staples—Blind, Boardman's Pat., ⅜ & ½.....₱ ℔ 37½c
Skates—White's.....dis 20
Barney & Berry's—N. Y. Club Japanned Top.....$2 20
" " B. & B. Club Blued Top..... 2 85
" " B. & B. all Clamp, Nickel Plat. Fastening..... 4 25
" " B. & B. Rink..... 10 50
Straps, Skate—Russet and Black.....net @ 20
Spoons, Iron Tinned.....dis 10 %
" by the case.....dis 20 %
Plated Rogers' A No. 1.....dis 30&5 %
Britannia.....dis 40 %
Squares—Steel and Iron.....new list 50 %
Shoes, Horse—H. Burden & Sons.....₱ keg $6 50
Shovels & Spades—Shepard, Forsyth & Dennison..dis 20 %
Saws—Henry Disston & Sons.....dis 10 %
Scales—Buffalo Scale Works.....dis 25 %
Fairbanks.....dis 15 %
Shears—Seymour's.....dis 5 @ 11 %
Traps, Steel—Newhouse.....dis 20 %
Tacks—Half Weight Am. Iron.....dis 67½&7½ %
Vises—Parallel, Buffalo.....dis 15 %
Wrenches—Coes' genuine.....dis 30&10 %
Coes' Imitation.....dis 50&10 %
Tafts' Pattern.....dis 65&10 %
Ware—French, Tinned and Iron.....
Stamped and Japanned.....
Cast Iron Hollow.....dis 25 %
Tin Plates.—Add for each X.....2 50
10x14, IC. Charcoal...$11 00 14x20 " terne.....$11 25
12x12, " ... 14 50 20x28 C. " 21 50
12½x17, " ... 17 50 20x28 X. " 29 00
14x20, " ... 15 50
Pig Tin—Straits.....38c @ 39
Banca.....44c @ 45
Bar Tin.....40c
Solder.....No. 1, 21 c; No. 2, 19 c
Sheet Zinc—
"Lasalle".....570 300 200 100 ℔ casks
11 00 $11 20 $11 20 $11 30 ₱ 100 ℔s
Iron Wire—Bright and Annealed.....dis 30 %
Coppered.....dis 25 %
Tinned.....dis 15 %
Tinned Broom, Nos. 20 21 22 } dis 20 %
20c 21c 21c }
Copper—Sheathing 14 @ 18 oz.....₱ ℔ 37c
Planished.....₱ ℔ 44 @ 46c
Bottoms.....₱ ℔ 39c
Bolts.....₱ ℔ 40c
Braziers' Sheets.....₱ ℔ 40c
Sheet Iron.—
18 Common.....$5 80
24 Common.....6 00
24 W. D. Wood & Co., Smooth Finish.....7 25
Am. Russia..... A. B.
14c 12c
Gen. Russia, No. 1 stained.....21c
" " clean.....22c
Galvanized.....dis 25 %

PITTSBURGH.

Card Rates, 60 days.

Flat Bar.—
1½ to 4 x ⅜ to 1 inch..3·8c
4½ to 6 x ⅜ to 1 inch..4·0c
1⅜ to 6 x 1¼ to 1½ in..4·2c
Horse Shoes.—
All sizes.....5·3c
Heavy Bands.—
3½ to 6 x ¼ & 5-16 in..4·4c
1½ to 3¼ x ¼ & 5-16 in..4·5c
Light Bands.
3 to 6 x 5-16 to No. 12..4·8c
1¼ to 2¾ x 3-16 to No. 12.....5·0c
Hoops.—2¼ to 3 in...5·1c
3½ to 4¾ in.....5·3c
1⅜ to 2 in.....5·3c
1⅜ to 1 11-16 in.....5·6c
1⅜ & 1¾ in.....5·9c
Round and Square.—
1 to 1¾ in.....3·8c
2 to 2¾ in.....4·1c
3 to 3½ in.....4·3c
3¾ to 4 in.....4·8c
⅝ to 9-16 in.....4·2c
¼ to 1¼ in.....4·4c
⅝ to ¾ in.....4·6c
Oval Iron.—
¼ to 1¼ in.....4·4c
⅝ to ¾ in.....4·6c
Half Oval and Half Round.—
¼ to 1¼ in.....4.7c
⅜ to ¾ in.....5·2c

1¼ & 1½ x ¼ to ⅜ in....4·0c
1¼ 1¾ x ⅜ to ½ in....4·1c
⅝, ¾ & ⅞ x ⅜ to ½ in..4·2c
Nail rods.....7·7c
⅞ to 1¼ x ¼ & 5-16 in...4·8c
½ to ¾ x ¼ & 5-16 in...5·0c
1 to 1¾ x 3-16 to No. 12..5·4c
⅛ to ½ x 3-16 to No. 12..6·0c
1 in.....6·3c
⅞ in.....6·8c
¾ in.....7·3c
⅝ in.....7·8c
½ in.....8·3c
½ to 7-16.....4·5c
⅜ in.....4·6c
5-16 in.....5·0c
¼ in.....5·4c
3-16 in.....7·4c

Sheet Iron,	Boiled.	Charcoal.	Jun.
10 to 14	5·8	7·3	8·8
15 to 20	6·0	7·5	9·0
21 to 24	6·2	7·7	9·2
25 to 26	6·4	7·9	9·4
27	6·6	8·1	9·6

All sheets over 28 in. wide, ¼c. ₱ ℔ extra.

Tank Iron.—
3-16, ¼ & ⅝ in. thick..5·6c
Boiler Plate Iron.....8·5c
Heads not flanging.....6·1c
Railroad Iron—Countersunk and Punched.—
1¼ x ⅝, 7-16 & ½ in ...4·8c
1¼ x ½ & 5-16 in...5·8c
Extras for Cutting to Length.—
Flat bars and rounds and squares.....1c
Flat bars for tire.....1c
Heavy bands.....3c
Light bands and wagon box iron.....4c
Hoops.....5c
Nails—Standard list.....$4 50
100 keg lots 12½c. off.

The following are the Card rates of Lewis, Oliver & Phillips:

Iron, standard list, assorted sizes, for large orders, 3·8c, card rate, 2 % off net.
Iron Wedges.....5¾c ₱ ℔ net
Norway Nail Rods.....9½c ₱ ℔ net
Fence Pickets—
¾ round, bent to shape.80c ₱ ft. of fence, less 5 % off net
Discount off Standard List.
Carriage and Tire Bolts (new list).....60&15 % off net
Plow Bolts.....25 % off net
Stove Bolts.....at the list price
Machine and Square Head Bolts.....25 % off net
Coach and Lag Screws.....25 % off net
Bolt Ends.....30 % off net
Pat. Hot Pressed Square and Hexagon Nuts, small sizes, from 3-16 to ¾ in.....6 c ₱ ℔ off net
Pat. Hot Pressed Square and Hexagon Nuts, large sizes, from 7-16 to 2 in.....4½c ₱ ℔ off net
Washers, all made from new band iron, small sizes, from 3-16 to ¾ in.....7 c ₱ ℔ off net
Washers, all made from new band iron, large sizes, from 7-16 to 1¾ in.....5 c ₱ ℔ off net
Nuts and Washers in 25 lb. boxes, 1c ₱ ℔ ex. Nuts and Washers in lots less than one keg each size, 1c ₱ ℔ ex.
Harrow Teeth, in lots of 1 ton or more, packed in casks, 1 in. diam. 8c ₱ ℔ net; ⅞ in. diam. 8c ₱ ℔ net; ⅝ in. diam. 8½c ₱ ℔ net.
Patent Headed Harrow Teeth, packed in casks, ½c ₱ ℔ ex
Skein Bolts, in bulk, in lots of 5 kegs or more, ⅝ in. diam. 8c ₱ ℔ net; 9-16 in. diam. 9c ₱ ℔; ½ in. diam. 10c ₱ ℔. 1c ₱ ℔ extra when less than 1 keg of each size is ordered.
Screw Hook-and-Eye Hinges, ¾ to 1 in. diam. 9½c ₱ ℔ net; ⅝ in. diam. 10½c ₱ ℔ net; ½ in. diam. 12½c ₱ ℔ net.
Screw and Strap Hinges, in lots of 100 pairs or more, 14 to 36 in. long, 7c ₱ ℔ net; 8, 10 & 12 in. long, 8½c ₱ ℔ net.
Strap and T Hinges.....30 % off net, delivered
Screw Hitching Rings.....$6 50 ₱ 100 net
Duck Nest Tuyere Irons.....$16 00 ₱ doz net
Cast Iron Washers.....₱ ℔ 4½c net
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long.....₱ ℔ 5½c net
1 to 2 in. diam. from 4 to 8 ft. long..... " 5½c net
1 to 2 in. diam. from 1¾ to 4 ft. long..... " 6 c net
⅞, ¾ and ⅝ in. diam. over 4 ft. long..... " 6½c net
⅞, ¾ and ⅝ in. diam. from 1¾ to 4 ft. long " 6¾c net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ₱ set of 8 bolts.. 55c
12 " ½ " " 8 " .. 70c
10 " 9-16 " " 8 " .. } 90c
12 " 9-16 " " 8 " .. }
14 " 9-16 " " 8 " .. } $1 00
10 in. long by ⅝ at Screw End, ₱ set of 8 bolts.. } 1 00
12 " " ⅝ " " 8 " .. }
14 " " ⅝ " " 8 " .. 1 10
16 " " ⅝ " " 8 " .. 1 20
5c ₱ set for each additional inch over 14 in. All lengths made.
Wagon Box Rods, narrow track, each.....18c
" " wide track, each.....20c
Single Tree Irons, ₱ set of four pieces.....38c
Wrought Iron Bolster Plates, 2¾ in. wide, ₱ set.....60c
" " " 3 " " 65c
" " " 3½ " " 70c
" " " 3½ " " 75c
Wagon Brake Ratchets, each.....16½c
" " " finished with guard, each..45 c
Wrought Hammer Straps, heavy pattern, each.....16 c
" " " light " each.....13½c
" Rub Irons, each.....11 c
Stay Chain Hooks, each.....8 c
Double and Single Tree Clips, figure 1, each.....9 c
" " " 2, each.....10 c
" " " 3, each.....12 c
Strap Bolts, Rods, Single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks and Clips, in lots of 100 sets.....dis 25 %
Wagon Box Staples, 1¼ to 2½ in. to clinch, ₱ 1000 $13 50 net
" " Box Iron, to rivet on, ₱ 1000 9 50 net
Neck Yoke Eyes, each.....5½c net
" " with ⅝ rings, each.....8½c net
King Bolts, ¾, 1, 1¼, and 1¼ in. diam.....₱ ℔ 5½c net
Wagon Rivets, ex. large, oval and steeple head, ¼ in. diam. all lengths..... " 10 c net
Wagon Rivets, 3-16 in. diam., all lengths..... " 12 c net
" & Nails, in 5 ℔ paper boxes....₱ ℔ 1c extra
" " in 25 ℔ wood " .... " ½c extra
Wagon and Hinge Nails, ¼ in.....₱ ℔ 17 c net
" " 3-16 in..... " 19 c net
Double Tree Plates.....
Coupling " .....} " 9 c net
Tongue " .....
Neck Yoke Plates..... " 12 c net
Tongue Cap Iron, 1¼, 2 & 2¼ in. wide, same price ₱ ℔ as Band Iron.
Wagon Chains, Stay Lock and Tongue, 5-16 in, ₱ ℔ 11½c net; ¼ in., 12½c. net

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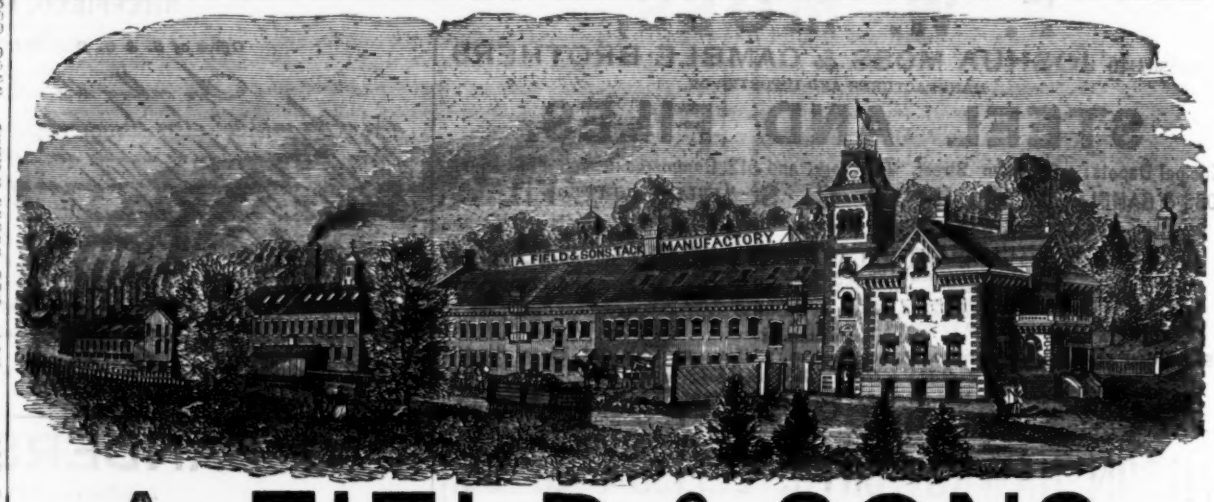

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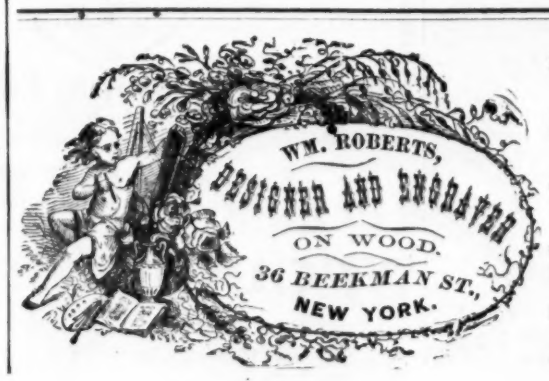

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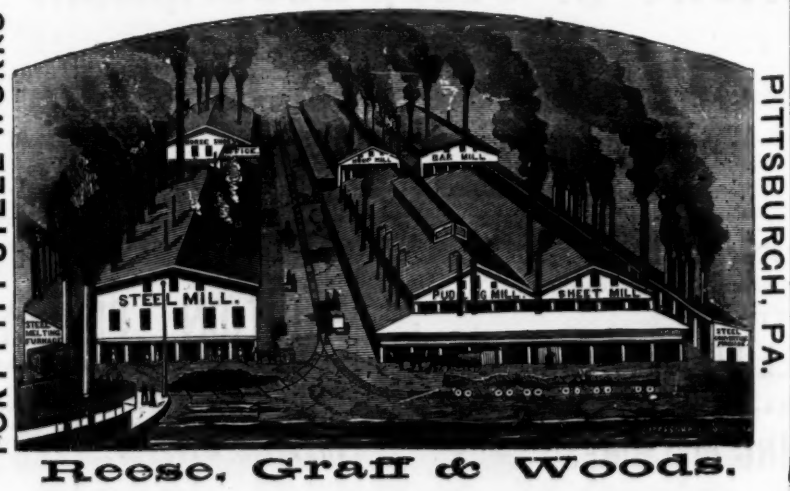

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" " Acorn Loose Joint....dis 40 %
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No. 35 " 3 ft., No. 6 " snap....℔ doz 3 62
No. 40 " 3½ ft., No. 5 " toggle..℔ doz 3 75
No. 45 " 3½ ft., No. 5 " snap....℔ doz 4 00
No. 50 " 4 ft., No. 4 " toggle..℔ doz 4 25
No. 55 " 4 ft., No. 4 " snap..℔ doz 4 50
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Hatchets.—Underhill Edge Tool Co....dis 10 %
Underhill pattern, solid, C. S. lathing....$9 50
Hinges.—Strap and T, Stanley Works....dis 30&7½ %
Plate, Loose, and Fast Joint....℔ lb., 8c
Wrought Screw Hook....℔ lb. 8c
Locks.—P. & F. Corbin....dis 40 %
No. 408, Iron Face and Bolts, Mortise, 3½ inch, per doz net....$1 88
No. 1000, reversible rim knob....$2 25
Mattocks.—K. P. & Co., axe finish, long cutter..$13 75
Short cutter....13 50
Metal.—Babbitt, No. 1, 38c; 2, 25c; 3, 16c; 4, 15c ℔ lb.
Nails.—10c and larger....$4 75
Paper.—Finest Quality Manila....℔ lb. 11c
Parers.—Reading, New Pattern....per doz $8 00
Turn Table....per doz 8 50
Picks.—K. P. & Co., Polished Points—
5 to 6....per doz $10 00; 6 to 7, $10 50
Pulleys.—Clark & Co.'s Axle, 1¾ in.—
....per doz 37c.; 2 in., 42c
No. 115, Axle, 1¾ in....per doz 87c
Plated Ware.—Rogers Bros....new list dis 30 %
Pocket Knives.—Conn. Cutlery Co....new net list
Rivets.—Black....dis 25 %
Carriage, oval head, Nos. 3, 4, 5, 6, 7, 8.
13 13 14 14 15 16c ℔ lb. net
Sad Irons.—Reading....℔ lb. 4½
Saws.—Disston's....dis 12½ %
Lightning X cut, Boynton's....per foot 70c
" Saw Blades, 32 inch....per doz $7 00
" Framed Saws....per doz $10 00
Common " " ....per doz 6 00
Disston " " ....per doz 9 00
One man X cut.—Lightning....per foot 77c
Disston's $3·00 each....dis 12½ %
Saw Clamps.—Reading....$11·25
Screws.—American Screw Co....dis 47½ %
Shovels.—O. Ames....new list dis 10 %
M. B. & D....dis 10&5 %
Snow, malleable iron tip, D handle....$6·50
" " plain....5·50
Sifters, Coal.—McMasters....$12·00
Sinks.—Cast Iron, 2, 2½, 3, 3½, 4, 4½ feet.
$1·37 $1·62 $2·25 $2·75 $3·75 $4·75 each.
Tools.—Aiken's Pattern, 20 in set; Miller's Falls, $12·00 per doz....dis 15 %
Traps.—Oneida....dis 20 %
Blake's....dis 20&5 %
Try Squares.—Star Tool Co....dis 33⅓ %
Vises.—K. P. & Co.'s Solid Box, Blacksmith...℔ lb. 15½c
Parker's Parallel....dis 5 %
Backus....dis 25 %
"Howards" Parallel....dis 10 %
Weights.—Window Weights....℔ lb. 2½c
Wrenches.—Coe's Genuine Wrenches....dis 40 %
Wringers.—
Novelty and Universal, Tub No. 2, less than 5 doz..℔ doz $ 72 00
5 doz..℔ doz 69 00
10 doz..℔ doz 67 00
Moritor, Double Cogs....per doz 66·00
Novelty Bench, No. 4, less than 5 doz..℔ doz 108 00
5 doz..℔ doz 104 00
10 doz..℔ doz 101 00
Zinc.—Sheet....℔ lb. 10½c

Boston Metal Market.

(Corrected by Fuller, Dana & Fitz.)

Tin Plates,— ℔ box | I. C. Coke....@ $12 00
I. C. Charcoal..@ $13 50 | " Terne....11 50@ 13 00
Pig Tin,— ℔ lb | Straits, gold....32c
Banca, gold....31c | English " 32c
Copper.— ℔ lb | Braziers....40c
Sheathing....38c | Ingot....29c
" Yellow....c | Old....26c
Bolt....40c
Lead,— ℔ lb | Sheet and Pipe....9·45c
Spanish Pig, gold....9¼c | Old....6¾c
Spelter, ℔ lb | American, gold....7c
Silesian, gold....8c
Zinc,—Sheet....℔ lb. 10¼c
Iron.—Sheet Iron, Russia, gold....℔ lb. 18c
Sheet Iron, English....7c
" " American....7½c
" " Galvanized....11c @ 18c
Swedes Bar Iron, Flat, gold....℔ ton, $145 00@ $155 00
" Shoe Shapes, gold....155 00@
Norway Bar Iron, Flats, gold....145 00@ 152 00
" Shapes, gold....155 00@
" Round, 2 in. to ¾ in., gold....147 50@ 152 50
" " 11-16 to ¾ in. " ....162 50@
" " 5-16 to ¼ in. " ....165 00@
" Nail Rods, Rolled " ....177 50@
" " " B. " ....172 50@
" " " Benzon " ....167 50@
" " " Vasa " ....160 00@
" " " N I W " ....160 00@
English Refined Bar Iron....87 50@
Scotch Pig Iron....49 00@ 45 00
American " ....36 00@ 44 00
Wrought Scrap Iron....45 00@

Steel.— ℔ lb | German....11c
Eng. Tool, gold....16c | Spring....9c
" Mach. "....10c | Tire....8c
American Tool....16c | Sleigh Shoe....6¾c
" Mach....11c | Toe Calk....6¾c
Bessemer....8½c@9½c

ST. LOUIS.

Corrected weekly by Semple, Birge & Co.

Anvils.—Armitage....℔ lb., gold, 18c
Peter Wright's...." 14½c
Wilkinson's...." 12½c
Apple Parers.—Conqueror....℔ doz, $9 00
Lightning...." 9 00
Turn Table...." 9 00
Augers and Bits.—Cook's....dis 25 %
Ives'....dis 20 %
Jennings'....dis 5 %
Snell's....dis 12½ %
Axes.—Hunt's....℔ doz $14 50@ 15 50
Lippincott's...." 14 00@ 15 00
Lippincott's Pioneer...." 14 50@ 15 50
Simmons'...." 13 50@ 14 50
Axles.—Kritch & Crane Mfg. Co.'s—
Patent Taper Axles....dis 10 %
Swelled Taper Axles....dis 10 %
Concord Axles....dis 10 %
Red Jacket Axles....dis 10 %
Common Axles, 1½ inch and upward....℔ lb., 8½c
" " less than 1¼ inch....9¼c
Bells.—Troy, Church....℔ lb., 50c
Light Brass, Hand....dis 50 %
Moore's, Cow....dis 10 %
Bolts.—Arms, Bell & Co.'s Machine....dis 10 %
Arms, Bell & Co.'s Carriage and Tire..new list dis 20 %
Norway Iron Carriage and Tire....dis 40 %
Cast Iron Barrel, Shutter, &c....dis 25 %
Cast Butt Hinges.—Narrow Fast Joint....dis 25 %
Broad Fast Joint....dis 40 %
" Loose " ....dis 50 %
Reversible....dis 45 %
" Japanned and Silver Tipped....dis 40 %
Loose Joint "Acorn" " " ....dis 40 %
Excelsior Reversible Blind....dis 30&10 %
Lull & Porter's Blind....dis 35 %
Wrought Butts.—Narrow....dis 30 %
Reversible....dis 25 %
Broad....dis 25 %
Table Hinges....net list
Back Flaps....net list
Inside Blind Hinges....net list
Casters.—Porcel'n Wheel Bed or Plate..rev. list dis 15 %
Iron or Brass Wheel Bed or Plate....
Chain.—Eng. Coil..3-16 ¼ 5-16 ⅜ 7-16 ½ in.
14 11½ 10¾ 10 9½ 9c gold
Trace....6½-10-2 75c "
7-10-2 80c "
German Coil and Halter....new list add 25 % "
American Coil—Short Link.
Size, inches....⅜ 7-16 ½ 9-16 ⅝
Price cents ℔ lb....12¾ 12½ 10¾ 10 9½ net
Size, inches....11-16 ⅝ 13-16 ¾ 15-16
Price, cents ℔ lb....9½ 8¾ 8¼ 8 8⅛ net
Size, inches....1 1 1-16 1⅛ 1 3-16 1¼
Price, cents ℔ lb....8¼ 8¼ 8 7¾ 7½ net
All larger sizes same price as 1¼ in. st 4 chain 1c less than same size close link.
Chisels.—Socket, Firmer or Framing....dis 55 %
Clothes Wringers.—Colby's....℔ doz $66 00
Novelty...." 72 00
Universal...." 72 00
Monitor...." 72 00
Coffee Mills.—Parker's....net list
P. S. W. & Co.'s....
Corn Knives.—Dunn E'ge T'ol Co.'s Clip. ℔ doz $5 75
Disston's....6 00
Crow Bars.—Steel Pointed....℔ lb. 8 @ 10c
Solid Cast Steel...." 20c
Cutlery.—J. Russell & Co.'s.... } new list, dis 15 %
Lamson, Goodnow & Co.'s.... } new list, dis 15 %
Landers, Frary & Clark's....
Files and Rasps.—
Nicholson's Mill Files....$5 50 to the £, currency
Nicholson's Other Files....5 00 to the £, currency
Butcher's Files....7 00 to the £, currency
Heller & Bros. Horse Rasps....5 25 to the £, currency
Forks and Hoes.—
Auburn Mfg. Co.'s Hay and Manure Forks....dis 25 %
" " Handled Hoes....dis 20 %
" " Planter Eye Hoes....add 20 %
Winsted's Planter Eye Hoes....add 20 %
Hammers.—Yerkes & Plumb....new list net
Masons' Hammers....℔ lb 20c
Smith Hand Hammers...." 22c
Handles.—Axe.....Extra. No. 1. No. 2. No. 3.
$2·75 $2·25 $1·75 $1·00
Pick.....Extra. No. 1. No. 1½. No. 2.
$2·50 $2·00 $1·75 $1·25
Smith & Montross Fork, Hoe and Rake....dis 10 %
" " Broom and Mop....$12 @ $18 ℔ M.
Harrow Teeth.—1 inch Iron....℔ lb. 5½c
⅞ and ¾ inch Iron....5¾c
⅝ inch Iron....5¾c
Barbed or Headed....½c extra
Hatchets.—Hunt's....net list
Simmons'....dis 5 %
Hay Knives.—Lightning....℔ doz $22 00
Dunn Edge Tool Co.'s....℔ doz $14 50—dis 15 %
Fisher's....16 50—dis 10 %
Hinges.—Strap and T—St. Louis make....dis 25 %
Horse Nails.—Eureka....25c rates
Auxable....22c "
Northwestern....22c "
Eagle....19c "
National Patent Pointed....21c "
" " Extra Finished....22c "
Horse Shoes.—R. I. (Perkin's pat.)....℔ keg $7 00
Burden's....7 00
Mule Shoes....$1 00 extra
Rhode Island Trotting Shoes....2 50 "
Locks and Latches.—
Jones & Nimick's....revised list dis 40 %
Moorhead, Adams & Co....dis 40 %
Norwalk Lock Co.'s revised list....dis 35 %
Mattocks and Grub Hoes.—
Klein, Logan & Co.'s Mattocks....℔ doz. $15 00@ 16 00
Grub Hoes, Oval Eye....℔ doz. 12 00@ 13 00
Nails.—Wheeling....$4 75 rates.
Orders for 100 kegs 10c ℔ keg less.
Picks.—Klein, Logan & Co.'s R. R. and Clay ℔ doz.$12 00
Klein, Logan & Co.'s Coal....9 75
" " Poll....12 00
" " Stone....16 50
" " Tamping....19 00
Planes.—Ohio Tool Co.'s....dis 10 %
Eastern....dis 20 %
Post Hole Augers.—Clark's Patent—
No. 1, ℔ doz. $27; No. 2, $30; No. 3, $32....dis 20 %
Barton's Patent....℔ doz $25—dis 20 %
Vaughn's " 25—dis 10 %
Sad Irons.—Monitor Brand, Silver Polished....℔ lb 6c
Sash Weights.—Standard Solid Eyes....℔ lb 3½c
Saws.—Disston's....dis 10 %
Spear & Jackson's....$5 00 to £ gold
Hubbard, Lippincott, B. & Co.'s....dis 10 %
Branch, Crooks & Co.'s....dis 10 %
Livingston's Patent Buck....net list
Screws.—American Screw Co.'s revised list....dis 45 %
$2000 worth in 6 months....2½ % extra
Scythes.—Blood's C. S. & G. S....net list
Dunn Edge Tool Co.'s, Factory List....dis 15 %
Paris Furnace Co.'s....dis 25 %
Waldron's English....$10 00 to £
Scythe Stones.—No. 1 Ind'n Pond ℔ gr's, $7 00
Extra Indian Pond....7 50 } dis 25 %
Premium....9 50 }
Diamond Grit....13 50 }
Shovels, Spades and Scoops.—Ames'....50c off list
Lippincott's....new list net
Rowland's, Maxwell....revised list net
Sledges.—Smith & Stone or Coal Sledges—
Steel Face Polished....℔ lb., 17c
Solid Cast Steel....35c
Striking Sledges....℔ lb extra, 1c
Snaths and Cradles.....dis 20 %
Springs.—Cleveland Spring Co.'s—
Carriage and Express....dis 5 %
Blue Seat Springs....new list dis 10 %
Tacks.—Norway Tack Co.'s ½ weight....dis 67½ %
Brads....dis 50 %
Traps.—Newhouse Patent....dis 15 %
Reichard's Animal, Wood Bottom....℔ doz $10 00
" " Metal Bottom....12 00
Vises.—Solid Box....℔ lb 18c
Wilson Mfg. Co.'s....dis 15 %
Wrenches.—Coes' Genuine....dis 30 %
Coes' Pattern....dis 40 %
Taft's....dis 50 %

St. Louis Metal Market.

(Corrected Weekly by Messrs. R. Sellew & Co.)

Tin Plate.
IC, 10x14, Charcoal...$13 00 | IX, 20x28, Terne....$51 00
IX, 10x14, " ... 16 00 | IC, continuous, 20 in. x 200 ft.....
IC, 12x12, " ... 13 50 | IX, continuous, 20 in. x 200 ft.....
IX, 12x12, " ... 16 50 | IC, 10x14, best Coke.. 12 00
IC, 14x20, " ... 14 00 | IC, 10x14, good " .. 11 50
IX, 14x20, " ... 17 00 | IC, 10x20....19 50
IC, 20x28, " ... 26 00 | IC, 14x20....
Block Tin.
Large Pigs....40c | Bars....42c
Small " 41c
Sheet Zinc.
Casks....℔ lb 11c | Sheet....℔ lb 11¼c
Solder.
No. 1, Refined, in bars or plate....32c
No. 2, " " 31c
Pig Lead....8c
Sheet Copper.—18 to 100 lbs. Sheets 30x60....40c
14 to 16 lbs., Sheets 30x60....40c
10 to 12 lbs., " and 20x72....42c
6 to 9 lbs., " 46c
Tinned, 14 and 16 oz. 14x48....38c
Planished, 14 and 16 oz. 14x48....46c
" No. 7, 8 and 9....48c
Copper Bottoms....40c
Sheet Iron.— Com'n. Sm'th. Char'l. Jun.
No. 16 to 20....6¼c 7¼c 8¼c
No. 22 to 24....6¼c 7¼c 8¼c
No. 26....6¼c 7¼c 9c 11¼c
No. 27....6¼c 7¼c 9¼c 11¼c
Galvanized Iron....dis 25 %
Iron Rivets....dis 15 @ 20 %
Iron Wire....dis 25 %
Coppered Pail Bail Wire....dis 10 %
Copper Rivets and Burs....dis 10 %
Russia Iron.—Nos. 9, 10, 11 and 12, ℔ lb....23c
No. 1, stained, ℔ lb....23c
Imitation Russia, ℔ lb....18c

CHICAGO.

(Reported by Cragin Bros. & Co., 141, 143, and 145 Lake St.)

Tin Plate.—
IC, 20x14, Coke....$12 00 | IXX, 14x20, Charcoal.. 20 00
IC, 10x14, Charcoal. 13 00 | IXXX, 14x20, " ... 23 00
IX, 10x14, " . 16 00 | IXXXX, 14x20, " ... 26 00
IC, 12x12, " . 13 50 | IX, 14x14, " ... 27 50
IX, 12x12, " . 16 50 | DC, 100 Plate, " ... 13 00
IC, 14x20, " . 14 00 | DX, " ... 15 00
IX, 14x20, " . 17 00 | DXX, " ... 19 00
IC, 14x20, Coke Roofing....20 00 | DXXX, " ... 22 00
IC, 10x20 Coke, for Gutters....12 50
IC, 14x20, Charcoal Roofing....15 00
IX, 14x20 " 26 00
IC, 20x28, ...32 00
IX, 20x28, ...
Pig Tin,— | Small, 30 ℔....41c
Large, 60 ℔....40c | Bar Tin....42c
Zinc.—
In casks 1000 ℔ s....11 c | In sheets....11¼c
" 500 " ....11¼c | Slab....9c
Copper.—Copper Bottoms....40c
Sheathing Copper....38c
Planished Copper, 14x48....46c
Size, 14x52, 14x56, 14x60 }
Nos. 7 8 9 } Planished Copper....48c
Braziers' Sheets, 30x60,—6 to 8 lbs....46 c | 15 to 100 lbs....40c
10 and 12 lbs....43c | Ingot Copper....
Solder.—Extra Fine, C. B. & Co.'s Brand....25c | Bolt " 45c
Fine, No. 1....23c | Ordinary, No. ....21 c
Brad's" or Spelt'r Solder 35c | Plumbers' Solder....23c
Antimony....30c
Babbit Metal....15c @ 25c.
Galvanized Iron Conductor Pipe....℔ lb 10c
Sheet Iron.— Common. Smooth. Charcoal.
No. 14 to 24....6 c 7¾c 8¾c
25 & 26....6¾c 7¾c 9 c
27....6¾c 7¾c 9¼c
Add ¼c ℔ lb for 30 in. wide.
Galvanized Iron....dis 25 %
No. 15 to 20....15c | No. 27....18c
21 to 24....16c | 28....20c
25 & 26....17c
Russia Iron.— | No. 13....c
Perfect, 8, 9 and 10....23c | In Sheets, 1c. higher.
" 11 and 12....22c
American Russia.— | B....18c
A....15c | In sheets, 1c higher.
Lead.— | Lead Pipe, in full coils 10½c
Pig....8¼c | Lead Pipe, when cut, ...
Bar....10c | Sheet Lead....10½c

DETROIT.

(Reported by Messrs. Jewett & Root.)

Tin Plate.—Best Charcoal | **Copper.**—
IC, 10x14....$11 75 | Sheathing....31½c
IX, 10x14....14 50 | Copper Bottoms....39½c
XX, 10x14....17 25 | **Planished Copper.**—
IC, 12x12....12 25 | Sheathing, 14x48....46c
IX, 12x12....15 00 | Boiler Size, No. 7....48c
IC, 14x20....12 75 | " " No. 8....48c
IX, 14x20....15 50 | " " No. 9....48c
XX, 14x20....18 25 | **Pig Tin.**—
XXX, 14x20....21 00 | Large Pigs....38c
XXXX, 14x20....25 75 | Small Pigs....39c
DC, 100 Plate....11 25 | Bars....40c
DX, " ....14 00 | **Solder.**—No. 1....21c
DXX, " ....16 75 | No. 2....19c
DXXX " ....19 50 | **Bright Wire.**..dis 27½ %
DXXXX 100 Plate....22 75 | **Sheet Iron.**—
IX, 14x14....25 00 | No. 18 Am. Com....5·8c
IC, 10x14 W....11 25 | No. 24 Am. Com....6·0c
IX, 10x14 W....14 00 | Pat. Am. Russia "A,"
Roofing Tin.—Best Char. | Nos. 24, 25 & 26....14c
IC, Terne, 14x20....$11 25 | Russia No. 9, 10, 11&12, 21½c
IX, " 14x20....14 00 | W. D. WOOD'S & CO.'S SHEET IRON.—
IC, Terne, 20x28....24 50 | Nos. 15 to 20 Smooth $7 95
IX, " 20x28....29 00 | " 21 to 24....7 25
Coke Tin,— | " 25 & 26....7 45
IC, 10x14 Coke....$10 00 | " 21 to 24 Char'l.. 8 75
IX, 10x14, Coke .... 12 75 | " 25 & 26 " .. 8 95
IC, 14x20, " .... 11 00 | **Sheet Zinc.**—Any width....10¼c

CINCINNATI.

Reported by Sellew & Co., Importers and Jobbers Metals, No. 214, 216 and 218 Main street.

Tin Plate.—I. C. 10x14 Charcoal....$13·50@ $14·50
I. C. 10x14 best Coke....12·00@ 13·50
I. C. Terne, 14-20....12·00@ 13·00
I. C. " 20-28....26 00@ 27·50
I. C. Continuous....28 00
Pig Tin.— | Straits....℔ lb 41c
Banca....℔ lb 47c | English....41c
Solder.— | A I....℔ lb 24c
S. & C....℔ lb 28c | Roofing....22c
Lead.—Pig....℔ lb 7¼c@ 8c. | Bar....℔ lb 8c @ 9c
Copper.—
Ingot....℔ lb 30c @ 31c | Brazier, 6 to 9 lb...℔ lb 46c
Planished..." 51c @ 53c | " 10 to 14 oz..." 42c
Sheathing..." 44c @ 46c | " 14 to 100 lb..." 40c
Bolt....40c | Copper Bottoms..." 40c
Zinc.—Cask, 500 to 1000 lbs....℔ lb 11 c
Case, 100 lbs....11¼c
Slab....8½c @ 9c
Brass.— | Roll, No. 38 to 40...℔ lb 50c
Roll, No. 6 to 30.℔ lb 45c | Wire, No. 0 to 20...℔ lb 50c
" 30 to 38. " 65c | " 20 to 25..." 60c
Babbit Metal.— | Black Lead....℔ lb 25c
Sellew & Co....℔ lb 35c | Market....15c
Antimony....℔ lb 20c
Bismuth....℔ lb $6 00
Nickel....℔ lb $3 50
Sheet Iron.— | Am Russia A...℔ lb 14 @ 15c
Russia....℔ lb 20c @ 22c | " " B..." 13 @ 14c

	Com. B.	Smooth Fin. S.	L. U.	Smooth D	Re'fd.
15 to 20	6·0c	7·5c		9·0c	
22 to 24	6·2c	7·8c		9·2c	
26	6·4c	8·0c		9·4c	
27	6·6c	8·2c		9·6c	

Galvanized Iron.—Full bundles....dis 25 %
Nos. 18 to 20....15c | No. 27....18c
22 to 24....16c | 28....20c
25 to 26....17c
Bar Steel.—Silver, ℔ lb 21c; Crescent, 17½c.
Iron Wire....dis 25 %
Enameled Ware....dis 33⅓ %
One Piece Corrugated Elbows....dis 10 %

Charcoal Iron.		Russia Iron.	
4½ inch....℔ doz	$8·75	4½ inch....℔ doz	$8·00
5 " "	4·25	5 " "	10·00
5½ " "	5·25	5½ " "	13·00
6 " "	5·25	6 " "	13·00
7 " "	6·50	7 " "	14·00

Leader Elbows—Flat Crimp Refitted.—

	℔ doz.		℔ doz
2-inch	$2 00	2½-inch	$2 25
3-inch	2 50	3½-inch	3 00
4-inch	3 50	4½-inch	4 00

Sheet Iron Brend Pans....℔ lb 12c
American Broilers....℔ doz, $18·00
Tinmen's Machines....net list
Sad Irons....℔ lb, 5½c
Brass Kettles.—Ansonia....45c

London Metal Market.

(From The Mining Journal.)

Copper—℔ ton.	£.	s.	d.	£.	s.	d.
Best Selected	96	0	0	96	0	0
Tough Cake & Tile	93	10	0	94	0	0
Sheathing and Sheets	100	0	0	—	—	—
Bolts	103	0	0	105	0	0
Bottoms	103	0	0	106	0	0
Old (Exchange)	85	0	0	—	—	—
Burra Burra	93	0	0	94	0	0
Wire	℔ lb.	0	1	0¾	—	—
Tubes	"	0	1	0¾	1	1
Brass—℔ lb.						
Sheets		0	0	10	0	0	11
Wire		0	0	10¾	—	—	—
Tubes		0	0	11¾	0	0	11¾
Yellow Metal Sheathing		0	0	8¾	0	0	9
Sheets		0	0	8¾	0	0	9
Tin—℔ ton.						
English Blocks		125	0	0	126	0	0
Ditto Bars		126	0	0	127	0	0
Ditto Refined		128	0	0	—	—	—
Banca		122	0	0	124	0	0
Straits		121	0	0	122	0	0
*** Tin Plates**—† ℔ box.						
IC Charcoal	1 qual.	1	16	0	1	18	0
IX "	1 qual.	2	2	0	2	4	0
IC "	2 qual.	1	14	0	1	16	0
IX "	2 qual.	2	0	0	2	2	0
IC Coke		1	9	6	1	12	0
IX "		1	15	6	1	18	0
Canada Plates....℔ ton.		22	0	0	23	0	0
" at works....		21	10	0	22	0	0
Spelter—℔ ton.						
Foreign		27	0	0	27	10	0
To arrive					—		
Zinc—℔ ton.						
In Sheets		33	0	0	34	0	0
Iron—℔ ton.						
Bars Welsh, in London		12	10	0	—		
" to arrive		12	5	0	12	7	6
Nail Rods		12	15	0	—		
Nail Rods, Staff'd in L'ndon		13	5	0	—		
Bars		13	15	0	14	0	0
Hoops		14	15	0	16	0	0
Bars at Works		13	0	0	15	0	0
Hoops ditto		14	0	0	16	0	0
Sheets, single		15	10	0	16	0	0
Pig, No. 1, in Wales		5	0	0	6	10	0
Refined metal ditto		7	0	0	8	0	0
Bars, common ditto		11	10	0	11	15	0
Do, merchant, Tyne or Tees		11	10	0	11	15	0
Ditto, Railway, in Wales		11	0	0	11	10	0
Ditto, Swedish, in London		19	15	0	—		
To arrive		20	10	0	21	10	0
Pig, No. 1, in Clyde		5	5	0	7	0	0
Ditto, f.o.b., Tyne or Tees		4	10	0	5	10	0
Ditto, Nos. 3, 4, f.o.b					—		
Railway Chairs		5	5	0	6	0	0
" Spikes		12	10	0	14	0	0
Indian Ch'coal Pigs in L'don		10	0	0	12	0	0
Steel—℔ ton.							
Swedish, in kegs (rolled)					—		
Ditto (hammered)		21	0	0	21	10	0
Ditto, in faggots					—		
English, spring		25	0	0	—		
Quicksilver—℔ bottle		16	0	0	nom.		
Lead—℔ ton.							
English Pig, common		24	0	0	—		
Ditto, LB		24	0	0	nom.		
Ditto, WB		25	0	0	nom.		

Machinery, &c.

Morse Twist Drill and Machine Company,

New Bedford, Mass.,

SOLE MANUFACTURERS OF

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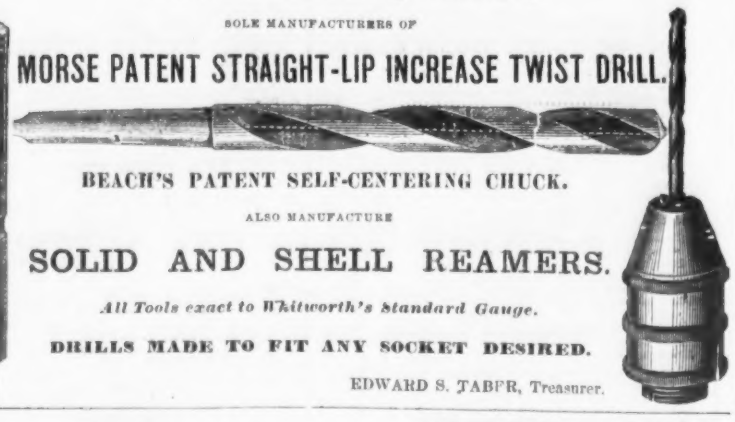

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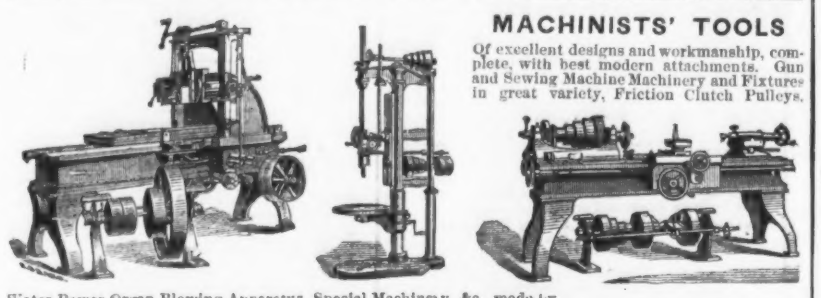

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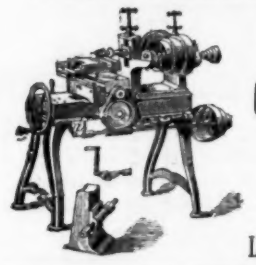

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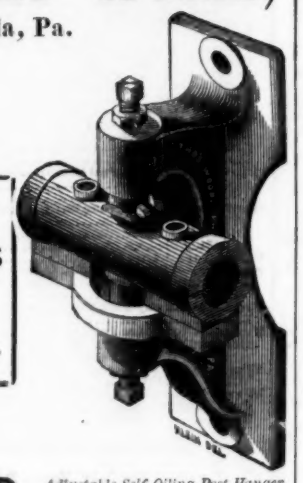

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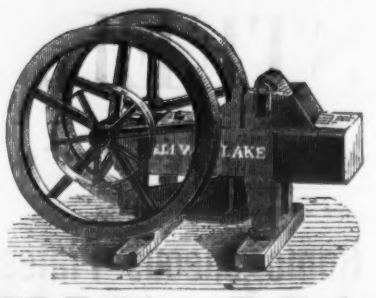

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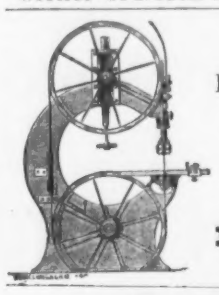

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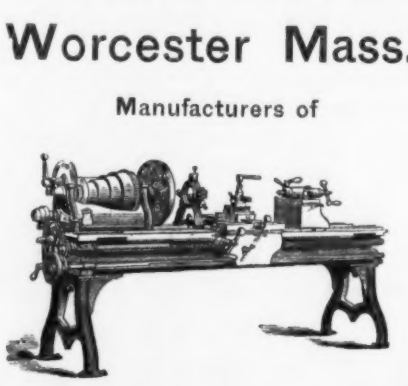

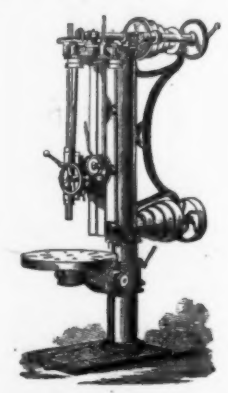

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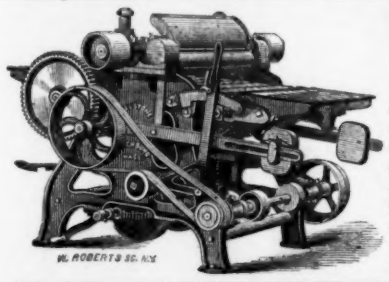

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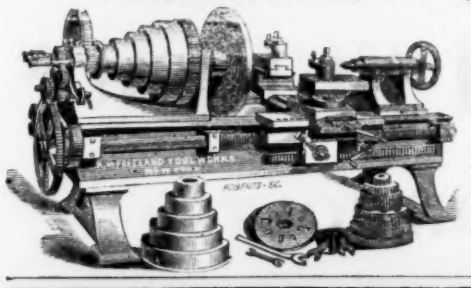

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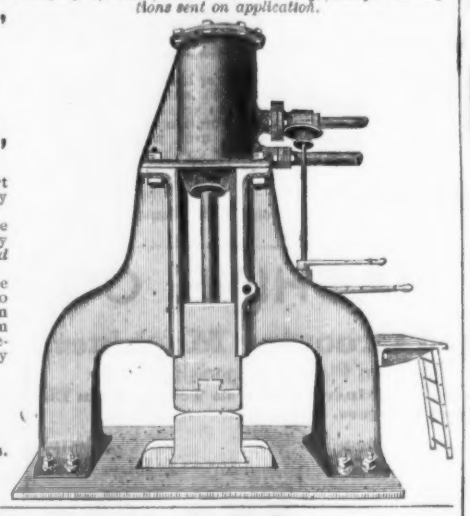

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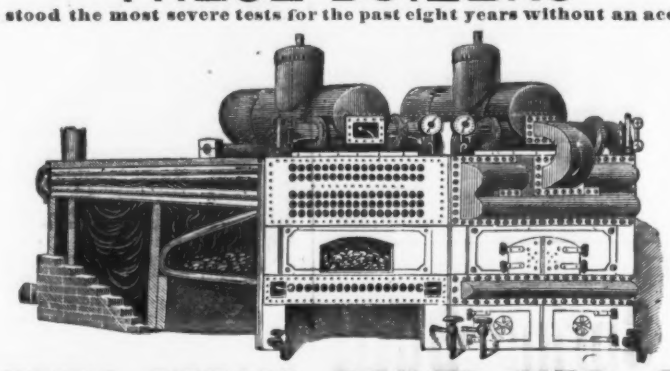

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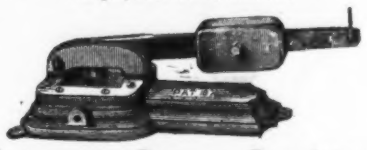

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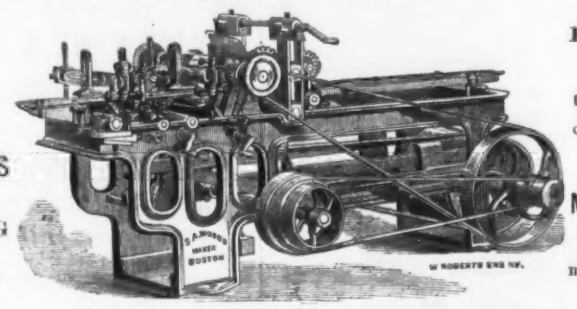

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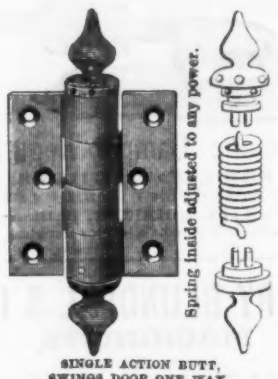

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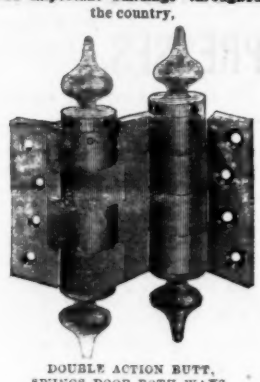

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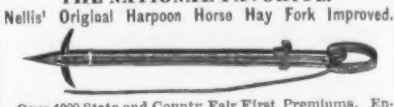

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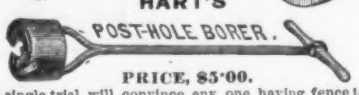

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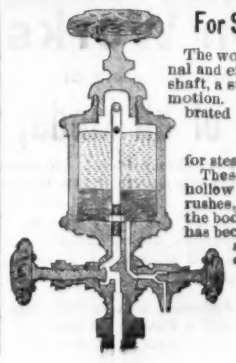

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